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TRINIDAD AND TOBAGO

ADMINISTRATION REPORT

of the

DIRECTOR OF AGRICULTURE

for the Year

1946

1948

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ADMINISTRATION REPORT OF THE DIRECTOR OF AGRICULTURE FOR THE YEAR 1946

CONTENTS

Introduction

PAGE

SECTION I—AGRICULTURE IN THE COLONY IN 1946
General Conditions 3

AGRICULTURAL PRODUCTS FOR HOME CONSUMPTION
Food Production 4
Livestock 4

AGRICULTURAL EXPORTS IN 1946
Sugar 6
Cocoa 6
Coconuts 7
Citrus 7
Other Crops 8

SECTION II—WORK OF THE DEPARTMENT OF AGRICULTURE
District Work 9
Marketing, Co-operation and Fisheries Division 10
Agricultural Credit Societies 10
Agricultural Co-operative Societies 11
Fisheries 11
Land Settlement Division 12

EXPERIMENT STATIONS AND DEPARTMENTAL INSTITUTIONS
St. Augustine Station 12
Government Stock Farm—Trinidad 13
Tobago Farm 16
Royal Botanic Gardens and Government Grounds 17

EXPERIMENT WORK AND SPECIALISTS' REPORTS
Central Experiment Station 17
Entomology 20
Plant Pathology 22
Cocoa Agronomy 25
Sugar Agronomy 25
Soil Chemistry 26
Veterinary 27

STAFF NOTES 27

SECTION III—PUBLICATIONS 28

SECTION IV—LEGISLATION
Agriculture 28
Veterinary 28

AGRICULTURE

Administration Report of the Director of Agriculture for the year 1946

Introduction

With the price of cocoa now raised above the uneconomic levels at which, for many years past, it had remained, the major agricultural exports of the Colony, namely, sugar, coconut products and cocoa are in demand at prices which, at present, give hope to these industries, for future marketing prospects and current prices justify progressive measures by estate and peasant producers alike.

2. The Colony has never been self-supporting in food, and although local food production has made some progress and is assisted by guaranteed minimum prices, considerable quantities of imported foodstuffs are still required. As these and other imported goods continue to increase in cost, upward adjustments become necessary in the wages of labour, fair rates for which are conditioned by general living costs. Stability in local agricultural production costs is, therefore, to a considerable extent determined by factors arising outside the Colony, and stability in the prices of these imported necessities will be a necessary pre-requisite to stability in local agricultural production costs.

3. Notwithstanding these considerations, however, the three agricultural industries mentioned are in a position now when they should, and must, look to the future and bend their energies to much more intensive agricultural production than has hitherto been the case. Rehabilitation of the cocoa industry is subsided and progress in this respect is dealt with later in this report. The sugar industry has benefited in recent years both from planting subsidies and financial assistance with factory upkeep and is now in a position to stand on its own feet, and the coconut industry is enjoying a period of remunerative prices. All of these industries must concentrate on sound agricultural practices based on the maintenance and improvement of soil fertility and on a programme of adequate replanting as an insurance for maintaining output in the years to come. Other forms of local agricultural production especially food and livestock production are in similar need of more intensive agricultural methods. The adoption of the practice of conserving organic matter and pen manure and returning them to the land must become general and must replace the methods of taking everything out of the land.

4. The building up of soil fertility is a matter of immediate urgency. There is more than a suggestion of declining fertility in our soils which is evidenced by the mediocre productivity of our cane fields despite the planting of potentially high yielding varieties and increased fertiliser use, the reduced productivity of cocoa lands apart from disease effects, and also by signs of declining productivity in many coconut and most lime producing areas.

5. The above problems need also to be attacked by detailed investigations both in the field and in the laboratory. In this connection, the need for the establishment of a central experiment station with adequate facilities has already been stressed and the progress to date in the establishment of such a station is recorded in Section II of this report.

SECTION I—AGRICULTURE IN THE COLONY IN 1946

General Conditions

Weather conditions were on the whole satisfactory with good planting conditions ruling up to July, adequate rains in August and September, and a marked short dry spell in October which enabled further ground provisions to be planted. Very heavy rains which were localised at the start of the wet season caused the loss of much of the late planted dry season vegetable crops in the Oropouche Lagoon area and, in Tobago, several landslips occurred on the steep hill sides under cultivation.

The rainfall recorded for representative localities throughout the Colony was :—

	1946	*Average* 1936-1945
Port-of-Spain	63.98 inches	64.15 inches
St. Joseph, Government Farm	72.51 ,,	64.87 ,,
Diego Martin, River Estate	78.00 ,,	71.26 ,,
Waterloo, Carapichaima	60.35 ,,	63.26 ,,
Couva, Esperanza Estate	87.32 ,,	71.62 ,,
Naparima, Usine Ste. Madeleine	65.28 ,,	65.06 ,,
Siparia, Police Station	64.80 ,,	65.67 ,,
Cedros, Perseverance Estate	63.31 ,,	58.78 ,,
Toco, Police Station	97.28 ,,	79.17 ,,
Rio Claro, Police Station	100.52 ,,	98.77 ,,
Tobago, Botanic Station	75.97 ,,	83.25 ,,
Mean	75.39 ,,	71.44 ,,

2. The labour situation remained generally easier throughout the year but there were localised shortages due to the considerable numbers engaged in such seasonal occupations as the fishing industry.

Agricultural Products for Home Consumption

Food Production

3. Reference to the continuance of the drive for maximum food production is given in Section II of this report. On the whole, markets were adequately supplied with produce but there was a marked scarcity of ground provisions in August and September when the normal seasonal shortage was accentuated by the necessarily very small releases of imported rice.

4. *Ground Provisions.*—With the exception mentioned in the previous paragraph, the supply of ground provisions was fair throughout the year. Dasheen and eddoes in season were in copious supply which only just missed glut proportions, there was, in fact, a localised glut of the former crop in the Eastern Counties. There is still room for increased production of yams, tannias and plantains. Production of yams of the better quality Lisbon type continues to increase and the relatively high cost of production is amply repaid by the demand for this crop.

5. *Grain Crops.*—Main crop maize again showed a decrease, the local custom having been the wasteful one of reserving this crop for land freshly cleared from tree crops and then burnt. Virgin land or land under abandoned tree crops is diminishing in area and such exploitation must be replaced by sound farming methods. The short dry season in October, however, allowed a second maize crop to be planted and the total corn production for the year was sufficient to meet immediate needs.

6. Rice production on the other hand showed a further welcome increase. The shortage of imported rice was an added incentive and resulted in almost every available field and even small roadside drainage areas, being planted up. Growing conditions were good and in spite of localised, late floodings, an above average rice crop was harvested which in many cases was followed by a fair ratoon crop.

7. *Pulses.*—Pigeon pea continues to be the main pulse grown and, in spite of its ease of cultivation, production of both green peas and dried peas falls short of the demand. The production of black-eye peas in the lagoon areas was adversely affected by unseasonal floods and the bulk of the small crop harvested was retained for seed purposes.

8. *Vegetables.*—The production of vegetables continued to increase, the demand being reflected in the comparatively high prices ruling. Cabbage, cauliflower, lettuce, tomatoes, salad beans, &c., are now established market garden crops and attention to varieties and better cultivation resulted in the supply of vegetables being spaced more evenly throughout the year. The dry season remains the period of maximum production, but most months showed a fair variety of vegetables on offer.

Livestock

9. *Diseases.*—There were no outbreaks of proclaimed diseases during the year. Details of the various diseases in the Colony are given in Section II of this report.

10. *Imported Feeding Stuffs.*—There was a marked improvement in the supply of concentrates during the year with the exception of the third quarter when a shortage was experienced. There was, however, an increase of about 35 per cent. on the 1945 prices.

11. *Importation of Animals.*—The following animals were imported into the Colony during the year and were inspected by the Veterinary Division :—

Animals for food

Type	*Source*	*Number*	*Total*
Cattle	Venezuela	2,869	
	Colombia	1,804	
	Dominican Republic	700	
	Dutch West Indies	150	
	British West Indies	3	5,526
Swine	British West Indies	3,319	3,319
Goats	British West Indies	5,320	
	Venezuela	4,991	10,311
Sheep	British West Indies	1,949	
	Venezuela	162	
	Dutch West Indies	72	2,183

Animals for Breeding and Work

Horses	United Kingdom	23	
	Canada	4	
	British West Indies	34	
	French West Indies	2	
	Dutch West Indies	1	64
Mules	United States of America	215	
	British West Indies	25	
	Dutch West Indies	19	259
Asses	British West Indies	30	30
Cattle	British West Indies	1	1
Goats	United Kingdom	3	
	British West Indies	3	6
Sheep	British West Indies	8	8
Swine	British West Indies	1	
	United States of America	39	40

12. In addition 42 dogs were imported during the year, including 16 from the United Kingdom and 22 from the United States.

13. The Venezuelan Government stopped the exportation of cattle from that country during the early part of the year and arrangements had to be made to obtain supplies from other sources, chiefly Colombia. The total number of cattle imported for butchering purposes was only one-third of the number in previous years.

14. Included in the above importations were 2 Berkshire boars and 4 in-pig gilts which the Department of Agriculture obtained through the British Colonies Supply Mission in Washington and 30 Durroc-Jersey breeding pigs imported by private enterprise to stock a piggery started in the Chaguanas area.

15. The Department also purchased in the United Kingdom from Miss Joan Little's piggery one yearling Large Black sow and three in-pig gilts which are due to arrive in the Colony in the early part of 1947.

16. With the assistance of Professor Miller, Director of Equine Research, Newmarket, a six-year old thoroughbred stallion of the hunter type, "Bold Friar" by "Bold Archer" out of "Sister Florence" by "Friar Marcus" was purchased during the year in the United Kingdom. This stallion is due to arrive in the Colony in 1947.

17. *Livestock Shows.*—The Trinidad Goat Society again held its annual show in Port-of-Spain. On this occasion the show was held in conjunction with a poultry show organised by the newly formed Trinidad Poultry Association. The joint show was well attended and the Department put up for sale by public auction 18 trios of poultry and 14 female goats which added to the attraction. The Department also exhibited British Alpine, Anglo-Nubian and Jumnapari goats as well as White Leghorn, Rhode Island Red and Barred Plymouth Rock fowls.

18. Seven annual cane farmers' and peasants' shows in the sugar belt were held at the end of the cane harvest and competition was again keen in each district.

19. *Juvenile Farm Clubs.*—The Tobago Farm Clubs operated from the schools have continued to stimulate interest in animal husbandry amongst the children and the results there have been encouraging. In Trinidad similar clubs have been less successful owing to the competing claims of a number of other diverse school projects and some unification of extra-mural activities is being explored.

Agricultural Exports in 1946

20. The year showed a further increase in the total value of agricultural exports, comparable figures for the past three years being:—

1946	$ 12,351,877
1945	9,876,651
1944	7,892,910

21. The bulk of the gain is due to the increase in the quantity and value of sugar exported.

22. The details of the 1946 exports are given below:—

		Quantity	*Value* $	*Value* $
SUGAR AND BYE-PRODUCTS				
Sugar	...ton	87,067	6,593,592	
Molasses	...lb.	6,086	65	
Rum	...p. gal.	617,120	1,229,345	7,823,002
COCOA				
Raw Cocoa	...lb.	6,626,862	1,171,781	
Cocoa Butter	...lb.	224	134	
Prepared Cocoa	...lb.	9,046	2,704	1,174,619
CITRUS				
Lime Oil, distilled	...lb.	16,604	107,804	
Lime Oil, handpressed	...lb.	228	3,194	
Raw Lime Juice	...gal.	83,623	64,833	
Lime, fresh	...lb.	8,058	651	
Citrate of Lime	...lb.	109,760	10,723	
Grapefruit, fresh	...No.	402,196	12,111	
Oranges, fresh	...No.	3,480,642	62,324	
Grapefruit Juice	...gal.	451,678	426,320	687,960
TONCA BEANS	...lb.	102,616	105,325	105,325
RUBBER, RAW	...lb.	529,375	369,964	369,964
COFFEE				
Raw Coffee	...lb.	1,287,000	204,156	
Prepared Coffee	...lb.	53,165	17,996	222,154
COCONUTS AND COCONUT PRODUCTS				
Copra	...lb.	—	—	
Edible Oil	...gal.	112,359	187,556	
Coconut Oil	...gal.	611,915	826,997	
Margarine	...lb.	264,545	75,240	
Lard Substitute	...lb.	243,275	62,046	1,151,839
	Carried forward			$11,534,863

		Quantity	Value $	Value $
Brought forward ...	...	...	...	11,534,863
Soap Stock	...lb.	180,950	21,237	21,237
Soap, Hard	...lb.	1,278,406	161,622	161,622
Fresh Vegetables	...lb.	252,572	51,760	51,760
Fresh Fruits	...lb.	113,716	4,943	4,943
Bananas	...stems	1,945	4,870	4,870
Peas and Beans	...lb.	100	44	44
Livestock and Hides				
Livestock	...	—	12,878	
Leather, undressed	...lb.	6,111	3,594	
Hides	...lb.	—	—	16,472
Bitters	...proof gal.	57,356	496,119	496,119
Honey	...lb.	7,722	1,411	1,411
Miscellaneous	...	—	58,536	58,536
Total Value of Agricultural Exports ...			...	$12,351,877

Sugar

23. *Production.*—The output of sugar in 1946 was 109,603 tons compared with 76,347 tons in 1945 and 74,262 tons in 1944. The upward trend in production reflects the replanting campaign which was assisted by subsidies in the latter part of 1943, in 1944 and in 1945. The following table shows the acreages planted during these years which qualified for payment of subsidy and the proportions so planted by estates and by cane-farmers.

	Acres		
	Estates	*Farmers*	*Total*
1943	3,135	2,001	5,135
1944	7,714	7,405	15,119
1945	10,132	5,660	15,792

(Figures given are those that qualified for payment of first instalment of subsidy in each case).

24. The industry is now in a position where it can stand upon its own feet ; there is room for the expansion of cane growing by farmers and estates alike and for these reasons no planting subsidies were paid in the year under review.

25. At the commencement of the 1946 crop, juice quality was only poor to fair but this improved as the season progressed and the final average out-turn was 9.12 tons of cane per ton of sugar. 651,003 tons of estate canes and 348,871 tons of farmers' canes were ground during the season and with the rainy season commencing in mid-May, it was estimated that some 32,000 tons were left as stand-over canes. The acre yield of cane on estates showed some improvement and averaged 25.28 tons per acre compared with the low figure of 19.83 tons in 1945.

26. Of the total production of 109,603 tons of sugar, 20,000 tons were retained as the quota for local consumption and the balance was purchased by and exported under the direction of the Ministry of Food principally to the United Kingdom and to Canada.

27. *Price of Canes.*—A minimum price of $5.50 per ton of cane was again guaranteed to the cane farmer under the terms of the Production of Cane and Sugar Ordinance, No. 9 of 1944. According to the formula under this Ordinance, the price was calculated at $6.77 per ton and this sum was paid in full to the farmer. Provision exists under the Ordinance for the levying of a cess not exceeding one-half of the determined price ($6.77) over the guaranteed minimum ($5.50) but, having in view the circumstances of the industry, Government decided that no cess should be levied in this instance.

28. Cane made good growth during the year. There was localised but severe froghopper attack during the latter part of the year but the recovery in most cases was good. Estimated total output of sugar in 1947 is placed at 120,000 tons.

29. With the termination of the payment of subsidies for planting, payments from public funds to sugar manufacturers on account of interest charges on the one hand and replacement charges on the other were considered to be no longer necessary, nor was it considered essential to guarantee a minimum price for farmers' canes. Accordingly the Production of Cane and Sugar Ordinance, No. 9 of 1944, which provided for all of these things, was replaced by the Production of Cane Ordinance, No. 61 of 1946. The new Ordinance made no provision for the payment of subsidies, it provided for a continuation of the practice of making contracts for cane deliveries between farmers and manufacturers and provided, as in the past, a formula whereby the price of farmers' canes was calculated.

Cocoa

30. Exports of raw cocoa during the calendar year were 6,626,862 lb. compared with 7,731,824 lb. in 1945 and 10,622,633 lb. in 1944. The crop year covers the months October to September and the estimate for the 1946-47 crop was originally 10,000,000 lb., but it is now considered that only with difficulty will the revised estimate of 8,000,000 lb. be reached.

31. The most satisfactory feature of the year has been the increase in price. From the low figure of $13.25 per fanega of 110 lb. or approximately 12 cents. per lb. at which the price had been steady for the past few years, a contract was made with the Ministry of Food for the supply of 835 tons, representing the amount of Trinidad's interim new crop allocation to the United Kingdom, at 132/6d. per 50 kilos C. & F. on parity with an increased American ceiling price. Thus the price to the producer was at once approximately doubled. Shortly afterwards the ceiling price for cocoa on the American Market was removed and the commodity became subject to normal trading. As a result, by the end of the year, the price had again risen and the producer was receiving $28.00 per fanega for plantation grade and $27.75 per fanega for ordinary grade cocoa sold to the United States of America.

32. The rising prices have not only provided encouragement for many planters to reclaim cocoa fields that had been semi-abandoned but have also enabled them to offer labour rates comparable with those ruling in other phases of agricultural industry.

33. The crop has declined to some 7 million lb. compared with 26 million lb. ten years ago and 75 million lb. in the peak year of 1921. As a result of sustained low prices, disease and low yields the cocoa industry is, on the whole, in a relatively bankrupt condition. Notwithstanding that the future long term market prospects of cocoa are good and that Government is offering substantial financial assistance in the rehabilitation of the industry the response by the majority of cocoa proprietors has not yet been marked but is improving.

34. It is to be hoped that increased prices and improved prospects will stimulate planters to a fresh effort to rehabilitate their plantations and will not merely have the effect of inducing the harvesting of crop from low yielding fields which at present prices may just pay their way.

35. Under the terms of the Cocoa Industry Ordinance, provision existed for the collection of a cess on all cocoa exported when the price of cocoa exceeded $15.10 per bag of 165 lb. This provision was suspended by Ordinance No. 1 of 1942 when it had proved impracticable to implement the Cocoa Subsidy Scheme and to provide any benefits arising from the collection of a cess. After consultations with producers' organisations it was decided to impose a cess of 2 cents per lb. on raw cocoa.

36. The position with regard to the rehabilitation of the cocoa industry by the planting of high yielding clonal cocoa and also with regard to virus and to witchbroom diseases is given in Section II of this report.

Coconuts

37. With the price of copra stabilised at the satisfactory level of $7.00 per 100 lb. the revival in the Colony's coconut industry was maintained as is shown by the following figures :—

ESTIMATED PRODUCTION OF COPRA

Year	*lb.*
1943	21,670,531
1944	29,313,693
1945	38,916,669
1946	39,617,401

38. Oil expression by factories during the year totalled 2,755,521 gallons of raw oil and its utilisation included the following :—

1,348,820 gal.	edible oil
1,572,745 lb.	lard compound
129,028 lb.	margarine
413,086 lb.	butter substitute
9,481,135 lb.	laundry soap.

39. Besides meeting the Colony's requirements of the above products, exports to the value of $1,313,461 are detailed at paragraph 22 above.

40. With the good price ruling and with the labour situation easing, a satisfactory drive was made to reap all available nuts. Confidence in the industry is reflected not only in improved maintenance of estates but also in the installation on some of the larger estates of artificial driers. Further attention needs to be paid, however, to rehabilitation of estates by replanting blank pickets, draining and manuring.

Citrus

41. There was a considerable planting of citrus to replace cocoa on soils considered unsuitable for the latter, Government alone selling over 83,000 budded plants during the year.

42. Exports of distilled lime oil showed a further decrease at 16,604 lb. compared with 23,300 lb. in 1945 and the figures reflect the decline in the industry due to the premature dying out of trees which condition continues to affect plantations throughout the Colony. No causative organism has been traced and planters are co-operating with the Department of Agriculture in carrying out various cultural and manurial treatments in an effort to arrest the condition.

43. The 1945-46 grapefruit harvest was a very satisfactory one and the Co-operative Citrus Growers' Association canned 200,648 cartons of juice compared with some 115,000 cartons in the previous season. For the 1946-47 season, it was possible to re-commence the export of fresh fruit, a trade which had necessarily lapsed during the latter war years and a price of $3.60 F.O.B. per case of 70 lb. was being obtained.

44. In marked contrast to lime cultivations, the grapefruit plantations receive, as a general rule, efficient cultivation and adequate manuring and this is reflected in the general well being of the trees.

Other Crops

45. *Tonca Beans.*—Exports during the year totalled 102,616 lb. compared with 108,920 lb. in 1945. This crop shows much variability in yield with many of the older trees passing several years without cropping. The trees were largely planted upon poor soils and soil exhaustion is doubtless effecting the older plantations. Although no appreciable extensions of the area under this crop are being made, the complete cessation of buying towards the end of the year due to heavy accumulations of stock in New York was a matter of considerable concern. Earlier in the year, the beans had been purchased at prices up to $1.00 per lb.

46. *Coffee.*—A very fair coffee crop was harvested with exports at the satisfactory figure of 1,287,000 lb. compared with 1,319,362 lb. in 1945. It should be pointed out that the latter figure included stocks that had accumulated due to export having been previously confined to the other West Indian Islands.

47. Prices paid throughout the year averaged 17½ cents per lb. for Arabica and 13½ cents. per lb. for Robusta.

48. *Rubber.*—The drive for maximum rubber production reached a new high level during the year, the following figures representing purchases from all sources :—

1943	300,508 lb.
1944	449,745 ,,
1945	490,753 ,,
1946	504,190 ,,

All of the above rubber was by agreement made available to the Government of the United States of America through the agency of the Rubber Development Corporation. This agreement comes to an end at 30th June, 1947, and the industry must be prepared to face the prospect of a substantial reduction in prices when selling on a free market in competition with eastern supplies.

SECTION II—WORK OF THE DEPARTMENT OF AGRICULTURE

49. The shortage of trained field staff continued to be felt during the year, nevertheless the development of an agricultural extension service was further consolidated. The organisation is based upon three territorial divisions, under the direct supervision of a Senior Agricultural Officer, namely, Tobago, North Trinidad and South Trinidad each with an Agricultural Officer. Agricultural Assistants or Senior Agricultural Assistants responsible to the Agricultural Officer cover a county, and Field Assistants responsible to the Agricultural Assistant operate within a section of each county.

50. The District staff assumed responsibility for food production work and the control of 'war gardens' as part of their normal duties and the Marketing and Co-operative Officer reverted to his substantive post and assumed control of Agricultural Credit Societies exercising the powers of the Registrar in this respect. The field work relating to Credit Societies was reorganised to fall into line with the District Extension Services, the Inspector and the Field Assistant in Trinidad each being responsible for a defined area and a clerk working under the general supervision of the District Agricultural Officer taking charge of credit societies in Tobago. These changes eliminated unnecessary duplication of effort and enabled the supervising officers to devote needed attention to the affairs of individual societies at the societies' headquarters.

51. Government has accepted the principle that outright sale of Government owned land should no longer be permitted, and has approved the policy of leasing agricultural lands to suitable applicants on long term leases of 25 years duration. A model lease is now in draft.

52. In the course of the year applications were received for the lease for agricultural purposes of portions of Government owned lands, formerly in estate cultivation, by a number of private individuals and after preliminary investigation by the field staff and the assessment of an adequate rental a number of such applicants were put into possession of these lands on a temporary lease pending the completion of the long term lease.

53. During the war years 'war gardens' had been established on considerable areas of Government owned lands and had been leased to cultivators, on annual tenancy, at the nominal rent of $1.00 per acre per annum in an endeavour to encourage maximum food production. On these areas the imperative needs of the times demanded that food should be produced rapidly and plentifully without any particular regard for the future well being of the land, and as cultivators did not look to continuity of tenure and were not permitted to reside on the lands much agricultural mining was practised. Many of the 'war gardens' areas were formerly cocoa estates on which the tenant felled and burned the trees and planted maize with little or no cultivation, taking as many successive maize crops as possible. This type of thriftless land abuse must be eradicated if any progress in agriculture is to be made.

54. In each 'war gardens' area the land was examined and an economic rental assessed. Cultivators were given notice of the termination of the existing tenancy at $1.00 per acre. They were informed that the intention was to charge an economic rent and to attempt to facilitate prolonged occupation of their gardens by means of long term leases, and it became clear by the end of the year that the majority of them were agreeable to such a development.

55. Whenever an adequate number of cultivators appear to be desirous of making permanent use of these 'war gardens' areas the next step will be to provide improved roads and if possible water supplies and to seek to develop the areas into permanent settlements, whereas in the normal land settlement the laying out of roads and the provision of water supplies have normally been a slow process and have preceded any form of agricultural development.

56. Thus at the present stage there are three methods whereby Crown Lands are being made available to the public for agricultural use namely :—

(*a*) The provision of food allotments which have been largely developed from the temporary 'War Garden' scheme ;

(*b*) The renting and leasing of larger holdings and estates in their entirety subject to the lessee submitting an approved programme of rehabilitation of the land ;

(*c*) The accepted method of land settlement whereby the chosen location is divided into holdings and such services as roads, water, etc., are provided and laid out before the tenant enters on the land.

District Work

57. Apart from normal extension work on crops both for export and for local food production the Senior Agricultural Officer, Dr. F. J. Pound, summarises as follows the various extension activities :—

58. *Staff.*—There were many gaps in the staff during the year and this prevented carrying out as complete a programme of work as we should have liked to complete. It is hoped that a number of Agricultural Assistants can be found in 1947 to complete the ranks.

59. *District Sub-Stations.*—The sub-stations at Sangre Grande and Rio Claro each concentrated on laying out and planting a 10-acre demonstration holding which was planned to have 4 acres ready to take Witches' Broom resistant clonal cocoa in 1947, 4 acres in arable plots and fodder and two acres in miscellaneous fruit, the fruit trees serving as windbreaks to the cocoa. Satisfactory progress was made towards establishing on each station the various crops needed for the general work of the station and in planting about 20 acres on each station with grain crops for stock feed in 1947. At Sangre Grande the Breeding Unit stable was nearly completed but no other farm buildings were started on either station.

60. The La Pastora Land Settlement Demonstration Plot made a good start but fell off badly owing to the age of the resident caretaker and his failing health. The Brooklyn Demonstration Plot did not make much progress beyond grading and levelling beds for planting in 1947 and cutting terraces for vegetables at the south end.

61. *Crop Survey.*—Considerable progress was made in the mapping of properties in the field and the collecting of data regarding ownership, crops, stock, etc. of each agricultural holding. The office work of checking and entering data on Ward Sheets was not able to keep up with the field work, but towards the end of the year it was arranged to bring to Head Office one Field Assistant per month to assist in this work. Some Ward Sheets have very few properties not yet mapped and in many ways these records are already providing useful references.

62. *Food Allotments.*—Some 256 Food Allotment Areas, the former War Emergency Gardens, were taken over and administered by the Extension Services and discontinued as War Gardens on 31st December, 1946. The time available to devote to them in 1946 was utilised in deciding which were the most desirable to become permanent peace-time allotments and assessing the economic rent to be charged with the new agreements for 1947. Plans were also made to reorganise some of the areas in 1947 by providing better access to plots.

63. *School Gardens.*—During the year the Field Staff devoted much more time to school gardens and commenced compiling a statement of the defects of each and making suggestions for their improvement. Some gardens are good but many are mediocre and a number are really poor with little interest shown in them by masters or children. On the whole the standard slowly improves year by year and more gardens manage to get into the good class for prize judging.

64. *Lease of Land.*—The rise in price of cocoa has been responsible for an unprecedented number of applications for leasing cocoa lands taken over by the Crown through default in payment of interest, and amortisation of mortgages. A very strict enquiry is made into the intentions of each applicant, his character, ability to farm the land well and his experience but many applicants were poorly educated, could not read pamphlets to learn how to improve their cultivations, nor have they much capital. As far as possible large areas have not been rented to any one applicant, the policy followed having been to create a large number of family holdings rather than to lease large parcels to be worked by hired labour.

65. *Breeding Units.*—Towards the end of the year the rural breeding units came under the care of the Extension Services. Where possible it is proposed to grow demonstration plots of food and fodder around the unit. It is also intended to follow up the results of services by stud bulls.

66. *Assistance to the Resettlement Officer.*—The Extension Services have carried out a large number of investigations on behalf of the Resettlement Officer and reported on the projects which ex-Servicemen have in mind and for which they require a loan from Government. In many cases applicants desire the funds for improving the family holdings, some have presented well-thought-out business-like projects but others have been very hazy about what they wished to do.

67. *Pest and Disease Control.*—The Field Assistants have kept an eye on the major controllable pests and diseases and conducted campaigns in most districts to reduce the incidence of bird vine, love vine and parasol ants, generally with very little co-operation from the public. They have also kept a watch on and reported upon crabs doing damage to rice seedlings, spider web on trees, squirrels, rats and other vermin of orchard crops and the numerous minor pests and diseases of vegetables. A special search has been made for virus infected cocoa trees outside the known infected area.

68. *Small Tractors.*—The 6-H.P. Anzani has proved too light to lend to settlers for work on unprepared plots and there has been little scope for it this year on the Department's plots. It does quite a good job of work on graded land which is not too heavy in texture. The 24-H.P. rotary hoe, despite many breakdowns, due to construction weaknesses has eclipsed all other light garden machines and proved very successful. With improvement in the design to eliminate breakdowns, the implement will prove a most useful one. In small tractors, the rotary hoe principle has shown advantage over the plough type in eliminating wheel slip.

68A. *Agricultural Bank Loans.*—A number of inspections of properties mortgaged to the Agricultural Credit Bank have been made and reports submitted.

69. *Committees and Clubs.*—The Extension Services keep in close contact with all rural development groups including District Agricultural Societies, 4-H Clubs, Farm Clubs, Peasants' Associations and numerous local gatherings of small farmers.

Marketing, Co-operation and Fisheries Division

70. The Marketing and Co-operative Officer, Mr. A. E. Trotman, reports on the work of the above division of the Department as follows :—

Marketing

71. *Produce.*—Produce marketing activities continued on the same basis as in 1945, the main objective being the stimulation of local food production by providing an assured market for specified food crops at guaranteed prices. Supplies were abundant in January and February and plentiful from March to June and purchases at Marketing Depots under the guaranteed price scheme were correspondingly heavy—heavier, in fact, than in 1945. But the supply position deteriorated sharply at the end of June and during the second half of the year, supplies were very short; the resources of the marketing organisations were then utilised to procure the requirements of Government Institutions. Purchases for the whole year were 2,199,636 lb. as compared with 3,015,146 lb. in 1945, 77 per cent. of all purchases being made in the first half of the year.

72. *Stockfeed.*—The preparation of a balanced dairy ration, using ingredients of local origin to the fullest extent possible, was continued and sales increased month by month until stocks of high protein feeding stuffs became exhausted. As an emergency measure, stocks of other ingredients on hand were then mixed and made available as a stock feed with a low protein content until these too became exhausted at the end of September when mixing was, perforce, suspended. The arrival of new supplies made it possible to resume the preparation of a good balanced dairy ration two months later. In all, 658 tons of mixed feed were sold direct to stock owners through marketing depots during the year. The price was 4½ cents. per lb. until December, when it was necessarily raised to 5½ cents. per lb. owing to the higher cost of imported ingredients.

73. Feeding stuff requirements of all departmental farms and stations, amounting to 488 tons in all, were purchased and supplied by the Marketing Division.

74. *Fish.*—The Mayaro Fish Depot was leased to local fishermen from the beginning of 1946 and only the three North Coast Depots, namely, Matelot, Grande Riviere and Toco, were operated. Purchases of fish at these depots totalled 160,115 lb. as compared with 211,356 lb. in 1945. This reduction in purchases was mainly due to smaller landings resulting from poor fishing conditions but purchases by itinerant dealers were also partly responsible. Fishermen operating from these beaches were supplied with fishing tackle through the depots at Port-of-Spain prices.

75. *Seeds and Planting Material.*—To ensure that the best seed obtainable was available at fair prices, selected corn, pigeon pea and yam seed raised on departmental stations and vegetable seeds imported from seedsmen of repute were made available to agriculturists through Marketing Depots and met an increasing demand. A co-operative society and a garden club were assisted by procuring their stated requirements for them and a special supply of tomato, water melon and cucumber seed was imported and made available at cost to growers in the Oropouche Lagoon who had suffered from floods earlier in the year.

76. *Cartridges.*—Special sales of shotgun cartridges were arranged by the Marketing Division at Police Stations in the more remote districts to assist agriculturists to secure the cartridges needed for the control of vermin.

Agricultural Credit Societies

77. Re-organisation of this sub-division followed the reversion of the Marketing and Co-operative Officer from his war emergency secondment to his substantive post. As with the District Services, the Colony was divided into three divisions, the officer in charge of societies in each division being directly responsible to the Marketing and Co-operative Officer. This re-organisation resulted in an all round increase in efficiency by the elimination of duplication and delays and the reduction of correspondence, which gave the inspectorate much more time to devote to the affairs of individual societies at their respective offices.

78. A review of the credit society movement led to the conclusion that while it had undoubtedly given valuable help to a number of industrious agriculturists, overall results were not altogether commensurate with the large sums loaned and the expenditure incurred by Government over a long period of years in fostering the movement. It was considered that the controlling Ordinance was defective but that the principal defects were due to the administration of these societies solely as money-lending organisations without due regard to their wider potentialities.

79. Revision of the Ordinance was deferred pending the proposed enactment of revised comprehensive Co-operative legislation now under consideration by Government, but considerable progress was made within the limits of existing legislation in remedying defects and overcoming limiting factors. The co-operative nature of a credit society has been stressed and societies have now taken over and are keeping their own books; auditing was expedited and societies were supplied with audited annual statements soon after the close of their financial year. The number of forms to be filled up in connection with each loan has been greatly reduced; steps have been taken to secure more business-like conduct and control of societies' affairs by their committees and members; overdue loans have been reduced to very small proportions: and a definite advance in general understanding of societies' affairs by their members can be recorded.

80. Steps were also taken to secure more effective use of the borrowed money by general education in the wise use of money, by making the technical advice of the District Staff directly available to societies when considering loan applications, and by advancing loans at more appropriate times of the year so that they could be applied to greatest advantage. The usefulness of credit societies has also been extended by making provision for loans up to 5 years for the erection of farm buildings, following agreement by the Agricultural Credit Bank to make appropriate loans to societies for this purpose.

81. *Numbers of Societies and Members.*—Twenty-three new societies were registered during the year and the registration of two moribund societies was cancelled; there was thus a net increase of 21 societies, bringing the total number to 129. Of these societies, 86 in Trinidad and 17 in Tobago depend upon the Agricultural Credit Bank as their source of credit while the remaining 26 constitute the Ste. Madeleine Group and are financed by the Ste. Madeleine Sugar Company. Aggregate membership of all societies increased to 4,835.

82. New loans amounting to $319,795 were contracted by 106 societies during the year, $236,378 having been borrowed by 82 societies from the Agricultural Credit Bank and $83,417 by 24 societies from the Ste. Madeleine Sugar Company. Societies in the Agricultural Credit Bank Group made advances to 2,934 of their members for the following purposes—$97,696 for cultivating food crops, $60,875 for canes, $15,632 for other crops, $45,688 for stock and $17,202 for improving buildings.

83. *Overdue Loans, and Reserves.*—Overdue loans were reduced to $3,662.65 by the end of the year and all societies' resources then aggregated $58,555, having been increased by $6,204 during the year.

Agricultural Co-operative Societies

84. One new society was registered during the year and there are now eight societies, one of which is in liquidation. Aggregate membership of the seven active societies is 1,099 and members' subscribed capital amounts to $187,522. Loan capital borrowed from Government amounts to $81,859 and reserves stand at $73,688. The book value of fixed assets is $180,000.

85. The Co-operative Citrus Growers' Association, by far the biggest and best run society, handled 197,500 crates of members' fruit most of which was utilised in the production of canned juice; but preserves and a small sample distillation of grapefruit oil were also produced and some fruit was sold fresh. Members received $1.20, $1.60 and $2.60 per crate of grapefruit, cocoa oranges and budded oranges respectively. The society further strengthened its financial position.

86. The Tobago Lime Growers' Association continued to operate its factory.

87. The three Co-operative Cocoa Fermentaries in Tobago cured 229,436 lb. of members' wet cocoa and sold 806 fanegas of dry cocoa. The continued decline of these societies was the subject of investigation and steps were taken to revive interest and to put their affairs into better order. The financial position of two of these societies is strong and that of the third, while not so strong, is not unsatisfactory, but increased turnover is necessary in all cases if they are to be economically sound and provide an attractive outlet for members' wet cocoa.

88. The Liquidator of the Tobago Producers' Co-operative Association made further considerable progress in paying of creditors and stated that liquidation would be completed early in 1947. A special general meeting of shareholders was apprised of the position and a committee, which has not yet reported, was appointed to consider whether an acceptable scheme of reconstruction could be prepared or whether the society should be wound up.

89. The Aranguez Vegetable Growers' Co-operative Society was registered in January, its objects being to market members' vegetables and to purchase members' agricultural supplies. The vegetable crop was poor and co-operative marketing was not started during the year but supplies to the value of $830 were purchased for members. Plans have been prepared for the erection of a depot on a plot of land at San Juan leased to the society by Government for that purpose.

90. Other co-operative projects that received attention during the year included a milk and produce marketing society of settlers at La Pastora who have been working and studying under the guidance of Trinidad and Tobago Welfare; a co-operative cultivation society in which settlers at Soconusco are interested; and fish marketing co-operatives at Matelot and Toco.

Fisheries

91. The post of Fishery Officer remained vacant throughout the year and there was thus no technical staff to work on the improvement of fishing technique, but some shore-work was carried out by the Marketing staff. Trials carried on at Matelot Fish Depot culminated in the preparation of palatable cold smoked and dry salted products from inferior species of fish; and good fish meal for stock feed was prepared from sharks.

92. *Shark Liver Oil.*—A programme of oil extractions from the livers of sharks caught by fishermen during their normal fishing operations was carried out and samples were sent to both the United Kingdom and the United States for appraisal. There was wide variation in the value of the different samples, the vitamin A content ranging from 5,000 to 63,000 I. U. per gram and the quality ranging from very crude to good. The commerical value of the least attractive sample was placed at $4.30 per gallon while the value of the best sample exceeded $60 per gallon. Thus there is little doubt that shark fishing in local waters has promising commercial possibilities and plans have therefore been made for far more extensive work both at sea and on shore at Matelot in the coming season.

93. *Fishery Statistics.*—Observations started in 1945 were continued in 1946 and records of several thousand gear-trips are now available. The type of gear used, the amount of manual labour involved, the weight of the different species landed and the value of catches have been noted. Of particular interest are the Port-of-Spain records where 90 per cent of all landings in 1946—more than 700,000 lb. of fish—were recorded. These records have not yet been completely digested.

Land Settlement Division

94. The Land Settlement Committee held three meetings during the year under the Chairmanship of the Director of Agriculture and with the Land Settlement Supervisor in attendance.

95. In the past Land Settlements were composed of two classes of lands, each of which was partitioned into plots of from one-half to two acres provided with access roads. One class was sold direct to tenants without competition at the Crown Land rate of $25 per acre, the second class being rented at from 2/- to 4/- per acre for two to four years and subsequently sold to settlers at $25 per acre.

96. As will be readily appreciated no form of control could be exercised over land usage after the former renter had become the landowner and this policy has now been discontinued in favour of continuous leasehold tenancy.

97. Settlers are now put into occupation on annual tenancy agreements and a model lease of 25 years duration with provision for payment of compensation for improvements is under preparation. Such leases, which contain provision for a renewal, will be given to satisfactory settlers to provide that security which is essential to induce a continuous improvement in farming standards. The leasehold settlements which cover approximately 2,100 acres are occupied by some 860 tenants.

98. The Land Settlement Supervisor, Mr. P. M. Hosten, reports the following progress during the year.

99. Financial provision for development and maintenance of land settlements during the year amounted to $259,617 and of this sum $182,628 was spent on Development and $17,322 on Maintenance. The unexpended balance was mainly due to the fact that water services which had been planned for five of the settlements were unavoidably held up.

100. Acquisition of lands included three estates in the Maracas Valley, which are to be laid out primarily as a settlement for ex-servicemen, and the Louis d'Or Estate, near Roxborough, in Tobago.

101. Road construction was the major item of development and 3,800 feet were cleared and graded at the new Maracas site and 21,000 feet at Rio Claro. 16,600 feet of road were metalled, gravelled and surfaced at the Munroe Road Settlement and minor road works were carried out at Alandale Extension and at La Tosca Settlements.

102. *Housing.*—Necessary major repairs to the houses on the La Pastora and Brooklyn Settlements which had been taken over from the Planning and Housing Commissions, were carried out. In some designs, these repairs necessitated raising the roofs to give a more adequate space between floor and ceiling and also in extending the roofs to give better protection to exterior walls. 142 houses were repaired during the year at an average cost of $503 per house.

103. La Pastora and Brooklyn are the only two settlements where each allotment is already provided with a house erected by Government. These two settlements were fully tenanted throughout the year and there is a waiting list of applicants for any allotment that should fall vacant.

104. On the other settlements, 59 new houses were erected by settlers themselves during the year and only the scarcity of building materials has limited further construction.

105. *Tenanting of Settlements.*—Actual tenanting of two of the new settlements has been delayed. In the case of Munroe Road, where 283 lots of half-acre size were laid out as house and garden sites, primarily to accommodate farmers from the neighbouring Caroni Irrigation Area, lack of co-operation within the East Indian community has been the chief cause whilst at La Reconnaissance, there was delay with the necessary approval of the area plans by the Local Health Authority.

106. Road work on the extension to the Alandale Settlement was completed and by the end of the year, 23 of the 50 allotments thus made available and varying in size from 2 to 3 acres, had been rented.

107. A slow but steady improvement can be recorded in the agricultural standards of the various leasehold settlements. The keeping of livestock is encouraged and new acquisitions by settlers during the year included 116 cattle, 111 sheep and goats and 139 pigs.

108. There was keen competition for the annual competitions for the best kept holding on each settlement and prizes included livestock, fruit trees and cash.

109. Rents collected during the year totalled $10,674.50 and this work has now been facilitated by the appointment to the division of a whole-time rent Collector.

Experimental Stations and Departmental Institutions

St. Augustine Station

110. The year's work at this Station was marked by an increased acreage under annual crops for seed selection purposes and by an increased output of economic plants for distribution. The gross revenue of the Station reached a record high figure of $45,923.00. Mr. R. E. Dean, the Manager, summarises the more important aspects of the year's work as follows :—

111. The distribution and sale of economic plants included 89,169 budded citrus, 4,386 budded Avocadoes and 1,093 grafted mangoes.

112. *Citrus.*—The accelerated production programme begun in 1945, with a view to making available 100,000 budded plants for distribution in 1946 was completed, and the planting requirements of the Colony were met in full. Actual production amounted to 109,698 plants, an increase of 406 per cent. over the highest total previously made available in any one year and as mentioned above, 89,169 plants were taken up by planters. Approximately 26,000 plants remained in the fields and are being carried over to 1947. Upwards of 130,000 seedling Sour Orange stocks were lined out in preparation for a production of 75,000 plants in 1947. Applications for deliveries in 1947 total 103,500 plants representing 432 separate orders and, with the carry over from 1946, these requirements should be met in full.

113. In attaining a total of over 109,000 saleable plants in the year, credit is due to the whole-hearted support given by the station staff and to a cash bonus system granted to propagators who achieved a 75 per cent. budding success or better. Mean success was the satisfactory one of 78.1 per cent. of stocks budded.

114. *Rubber.*—Experimental work continued with the double budding of rubber stocks. In this budding, the seedling stock is first budded with a high yielding Far Eastern clone to form the panel from which the tree will later be tapped. These Far Eastern clones are however, susceptible to leaf blight disease, so that the plant is later budded with a top or crown clone of the Ford-Brazil type resistant to leaf blight infection. The final tree, therefore, is made up of a local stock, a high yielding panel and a disease resistant top. The approved clones now being used are the following :

Oriental Panel clones (Susceptible)—G. V. 21, G. V. 31, G. V. 37 and GA. 255.

Ford-Brazil Crown clones (Resistant)—F. B. 54, F. B. 3363, F. 211, F. 409 and F. 1620.

The first distribution of single worked budded stumps of the resistant " Crown " clones was made to two departmental sub-stations, and to one commercial estate.

115. *Vegetable Trial Scheme.*—In co-operation with two active Market Gardeners' Associations and the Imperial College of Tropical Agriculture a scheme was initiated to test out new strains of vegetables. Seventeen varieties have so far been tested, seedlings being raised at St. Augustine and distributed.

116. *Annual Crops.*—10,696 lb. of seed from the three selected maize types were made available for distribution as also were 1,320 lb. and 746 lb. of the Tobago and Lasiba varieties of pigeon pea, respectively. Increased quantities of cover crop seed were made available for use at the Department's sub-stations. An extension in the area of *Pueraria sp.*—Kudzu—was laid down for seed purposes.

117. *Rice.*—Eleven popular varieties of rice selected for their reputedly heavy bearing qualities in the Caroni area were grown for testing comparative yield and for bulk seed selection purposes. Actual yield from the half acre plot was 2,016 lb. of dry paddy and calculated yields of the various types tested varied from 2,722 lb. to 4,764 lb. dry paddy per acre. Some of the varieties were very mixed, and single head selections were made from each variety with a view to isolating pure lines.

118. *Mulberry.*—Two consignments of cuttings were received from the British Caribbean Silk Company, Nassau, for propagation and distribution purposes. With the appearance of a vein chlorosis in the original propagating beds, the precaution was taken to restrict multiplication to material taken from two selected isolated blocks which showed no symptoms of chlorosis. The disease does not appear to be systemic nor does it appear to be transmissable by budding, therefore the chlorosis of mulberry leaves is considered to be a non-pathogenic physiological disorder. Investigation into the condition continues.

119. *Sugar-cane.*—Twenty-six new varieties were received from the Plant Quarantine Station for multiplication prior to release. Of these, planting material of eleven varieties was issued to estates for trial under field conditions.

120. *Citrus Experiments.*—The manurial experiments on citrus were continued. For the crop period June, 1945 to May, 1946, the average yield of grapefruit from 1,691 bearing trees, averaging 14 years of age, was 561 lb. of fruit per tree. In connection with the field studies of die-back of West Indian limes, plants budded on five rootstocks were released for observation purposes to certain plantations in some of the worst affected areas.

121. *Yams.*—Cultivation trials and plant material tests were carried out with Lisbon yams. The cultivation costs of this crop are high but the returns are good and the land is left in good heart after harvesting. The following costs and returns were obtained from an area of .55 of an acre grown on the Station on commercial lines during the year :—

Cost per acre including planting material	... $707.00
Yield per acre	...11.7 tons
Wholesale value at 4 cents per lb.	...$1,084.32
Profit per acre	... $387.32

121A. Other work on the Station included the establishment of selected guava trees and preliminary work on their vegetative reproduction ; raising and distribution of 8,052 boxes of vegetable seedlings and 15,904 ornamental trees and shrubs.

Government Stock Farm—Trinidad

122. Mr. A. P. McWilliam, Agricultural Officer, was in charge of the Government Stock Farm throughout the year and reports in part as follows :—

123. The administration of the farm benefited from the introduction of fortnightly meetings of the permanent staff at which the previous fortnight's work was checked and that of the following fortnight laid down, thus enabling every member of the staff to be fully aware of the work in each section of the farm.

124. Labour conditions improved considerably during the year though it was still necessary to employ a number of aged workers who would normally have been retired had younger men become available.

125. The breakdown of the milk processing plant (refrigeration section) during the last quarter of the year not only resulted in the loss of a considerable amount of milk, but also affected the milk yields of the cows as it necessitated very unequal intervals in milking to allow milk to be sent to Port-of-Spain early in the afternoon for cooling after pasteurisation.

126. A building was erected to accommodate a milking machine containing 16 milking stalls and 8 washing stalls.

Cattle

127. Improvements in breeding, feeding and management were successfully carried out during the year.

128. As there had been no sale of surplus stock on the farm since 1942 the records of a number of surplus bulls were investigated and 60 were culled as being unsuitable for breeding purposes.

129. Experience at the Government Farm and of private stock-keepers alike has shown that in general terms the mainta ning of pure-bred Friesian cattle is not satisfactory in the Colony, the animals tending to produce progeny of diminished productivity and inferior constitution. On the other hand, pure-bred or graded bulls of this breed mated to Zebu or graded Zebu cows have frequently produced an mals of good constitution and adequate milk performance. In examining the records of the farm it was decided to determine what bulls have made any notable contribution to the stock with the view to the continuous selection of breeding animals capable of transmitting satisfactory yielding capacity and proven adaptability to tropical conditions.

130. The examination of these records also revealed that Sahiwal cattle (Montgomery) exhibit considerable promise as a pure dairy breed and it has been decided to build up a herd of pure-bred Sahiwal stock and not to use the cows in cross-breeding work. The Sahiwal herd will be transferred to the Tobago Farm where it will be maintained as the only breed of cattle.

131. The strength in the cattle section at the Valsayn Farm at the end of the year was as follows :—

	13 head of pure-bred Friesians
	42 head of pure-bred Zebus (Nellor)
	21 head of pure-bred Zebus (Sahiwals)
	367 head of grade Friesians
	7 head of Oxen
TOTAL	450

132. There are also 23 head of pure-bred Murrah Water Buffaloes and 4 of these bulls were regularly stationed for service throughout the year on sugar-cane and coconut plantations.

133. The handling of the hand-reared calves is now receiving greater attention, more pens having been sub-divided and the accommodation increased. Weekly calf weighing is now routine and the average increase per week in 1946 was 5.6 lb. in all calves.

134. The results in the dairy herd of the farm can be summarised as follows :—

(1) Cows going dry in 1946—103
(2) Quantity of milk produced by them—439,217 lb.
(3) Number of milking days—29,791
(4) Average production per cow per day—14.8 lb.
(5) Average lactation period per cow—284 days
(6) Average production per cow per lactation period of 284 days—4,264 lb.

135. The five best producers, each of which is three-quarters Friesian and one-quarter Zebu, were as follows :—

Name	*lb.*	*days*	*Corrected to* 305 *days* *lb.*
(i) Bella	... 8,326	350	7,601
(ii) Ella II	... 7,613	303	7,613
(iii) Helen V. ...	... 8,180	376	7,437
(iv) Mathilda III ...	... 6,599	366	6,053
(v) Nancy Lovell ...	... 6,394	329	6,264

Poultry

136. The Rhode Island Red and White Leghorn hens recently imported from the United States of America are not doing as well as locally bred fowls at the farm. It is hoped that persistent and careful culling of local stock should eliminate, to a great extent, the necessity for regular future importations from abroad.

137. The entire poultry section was thoroughly overhauled during the year; grass was planted in the runs, the poultry house renovated, trap nests checked and wire netting of the runs mended. The strength of the poultry section at the end of the year was 537 as compared with 1,145 in 1945. This decrease was due to the destruction of a number of birds suffering from Laryngo-tracheitis caused by over-crowding. Egg production was satisfactory, but fertility was not up to the standard of the last two or three years.

Pigs

138. The accommodation was increased by the erection of 11 new sties and there were 113 pigs on the strength of the farm at the end of the year.

139. Early in the year two young Berkshire boars and four in pig gilts of the same breed were imported from the United States of America. The gilts farrowed in April and May and were bred in June and July in time for a second farrowing in 1947. One boar and two sows of these imported pigs were transferred to Tobago Farm later in the year.

140. In choosing young stock from these imported pigs for breeding purposes, selections were made from the larger litters. Seventy-seven young pure-bred pigs were sold privately during the year.

Goats

141. Several goat runs were divided to provide individual stalls most necessary for Does and Goatlings in kid.

142. At the annual show of the Trinidad Goat Society, British Alpine, Anglo-Nubian and Jumnapari goats were exhibited. Fourteen female does and goatlings were sold at this exhibition and 53 other goats were either sold privately or transferred to the Tobago Farm during the year. The number of goats on the strength of the farm at the end of the year was 59.

Horsekind

143. The thoroughbred stallion " Flotsam ", stood for service at the farm throughout the year as well as two jack donkey stallions. Four jack donkey stallions were stationed at district breeding units for breeding to mares and jennies.

144. The service fees were increased for horse stallions to throughbred mares from $25.00 to $40.00 and to half-bred mares from $20.00 to $30.00 due not only to increased cost of maintenance of the stallions, but also to the increased value of horses in the Colony generally. Stabling dues were also increased from $1.00 to $1.50 per day.

Rabbits

145. Mange broke out among rabbits at the farm and in spite of early and continuous treatment the condition could not be cleared up; it was, therefore, necessary to kill off all the animals and to restock after thoroughly treating all equipment. Healthy stock, however, have been maintained at out-stations of the Department.

Breeding Units and Stud Animals

146. These were maintained at the following centres :—

Breeding Units :—	River Estate	Diego Martin
	Mucurapo Pasture..	Port-of-Spain
	El Recuerdo Estate	Manzanilla
	Brooklyn Land Settlement	Sangre Grande
	Woodford Lodge Estate	Chaguanas
	Coora Estate	Siparia
Stud Animals :—	Maraval	
	Petit Bourg	
	Tacarigua	
	Toco	
	Forres Park	
	Fyzabad	
	Curepe	
	Woodbrook	
	St. James	
	Blanchisseuse	
	Toco	

147. These breeding units are to be taken over by the District Staff in 1947 who will be in a better position to follow up the breeding work in their districts.

148. The following services were recorded during the year at the Stock Farm and the Breeding Units, but the list excluded services by animals loaned to private individuals.

Sires	*No. of Services*
Pure-bred bulls	795
Grade bulls	486
Stallions to mares	46
Jack donkey stallions to mares	25
Jack donkey stallions to jennies	71
Buck goats	763
Boar pigs	110

Cultivation

149. Some 20 acres of fodder grasses, including Uba Cane were planted during the year, with an additional twelve acres in food crops including corn, adlay and cassava. Molasses grass, which had previously been tried as a grazing grass with unsatisfactory results, was established on a two-acre plot for trial as a fodder grass. It was found that cattle did not relish it when cut and carried to them; moreover, the areas cut during the dry weather not only failed to re-establish themselves but actually died out. A small area planted in tropical Kudzu (*Pueraria phaseoloides*) is growing well, but attempts to establish temperate Kudzu (*P. thunbergiana*) have not been successful. This finding is in harmony with results reported from Puerto Rico and from Hawaii.

Pastures

150. A series of small scale trials have been commenced on the pastures with a view to increasing both the yield and quality of the grass. The only cultivation included in this experiment was a light raking, but neither this nor pen manure nor any of the fertilisers tried produced any improvement in yield. Liming to half lime requirement actually resulted in a drop in yield. The trials are being repeated.

Buildings

151. Apart from normal maintenance the Public Works Department erected 12 bull stalls, 11 new pig sties and a building to house the De Laval Milking Unit consisting of 16 milking stalls and 8 washing stalls.

Investigational Work

152. Silage was made from Elephant grass in 1945 and this was compared in the early part of 1946 with fresh grass as a feed for dairy stock. Although the grass fed fresh was both younger and of better quality than the grass used for filling the silo, a double reversal feeding trial utilising two groups of cows showed that there was very little difference between the two feeds. The losses involved in making the silage were small and the cattle ate it readily. In view of the importance of ensilage as a means of storing high quality grass, the experiment is being repeated during the present year.

153. An attempt has been made to evaluate the possibilities of preparing a poultry food from entirely local sources. In the first trials maize and adlay were used as cereals; coconut meal and rice bran supplied vegetable proteins, while blood and yeast supplied animal proteins. The best of these mixtures only just maintained body weight and failed to produce eggs.

154. When animal protein in the form of skimmed milk was added to the best of these mixtures, there was a marked improvement. The fowls put on weight and laid eggs at least as well as those in a control pen fed on imported mash and grain.

155. Evidence was obtained that the addition of yeast to a locally prepared mash which included 10 per cent. of skim milk had a beneficial effect. The performance of the better layers was not improved, but that of the poorer layers was lifted up to the level of the better layers.

156. Poultry on free range did much better than those confined to runs, even though the runs were large (12 square yards per bird) and were well grassed.

Education

157. The vocational training on the farm for Ex-Servicemen was continued during the year and two district officers of the Department were also stationed at the Institution for two months working in each of the different sections. All these workers took an interest in their duties and worked intelligently.

Tobago Farm

158. Dr. J. L. Shannon, D.V.M., was appointed to take charge of the Tobago Farm on his re-employment as Veterinary Officer, Tobago, on a two-year contract. He reports in part as follows:—

159. The Hydraulics Department completed an irrigation scheme for fodder crops on an eight-acre block and Guatemala and Para grasses as well as adlay, maize and soya beans were planted on this area.

160. The quarters for the staff were nearly completed during the year as well as extra housing accommodation for the increased number of stock.

161. A great deal of difficulty was experienced in obtaining processing and sterilizing plant for the dairy, but it is hoped that this equipment will be erected in 1947.

162. In accordance with recommendations made in the report of the Agricultural Policy Committee, horse, donkey and mule breeding work on this Farm were intensified during the year. In addition, to the five imported Canadian draught mares, one of which unfortunately died as a result of an accident, the two large imported Kentucky jennies at the Trinidad Farm as well as two pure-bred jack donkey stallions (one imported) were sent over to Tobago.

163. It has also been decided to transfer all the other mares from the Trinidad Farm to this station in 1947 for mule breeding and to transfer all jenny donkeys as well.

164. During the year the fees for the services of the thoroughbred stallions in the Department were increased to $30.00 for half-bred mares and $40.00 for thoroughbred mares. Thirty-six privately owned mares were bred to thoroughbred stallions, 37 to jack donkey stallions and 101 jennies to jack donkey stallions.

165. It was decided to maintain the Sahiwal herd, a milk type of Zebu cattle, at this farm and these cattle were transferred to Tobago from the St. Joseph Farm. It was also arranged to stand a number of Sahiwal bulls in out-districts for service: during the year 60 privately owned cows were bred to Government bulls at the farm.

166. A pure-bred Berkshire boar and 2 in-pig sows of the same breed imported from the United States of America were added to the piggery during the year and the number of services to pure-bred boars amounted to 65.

167. The number of goats at the farm was increased and arrangements were made to stand four bucks at out-stations for service. The number of services to privately owned goats was 150.

168. The number of livestock on the strength of the farm at the end of the year was as follows:—

Thoroughbred stallions	1
Brood mares	6
Jack donkey stallions	5
Cattle (including 9 Sahiwal bulls)	44
Sheep	29
Goats	34
Rabbits	14
Poultry	176

Royal Botanic Gardens and Government Grounds

169. In accordance with the recommendation of the Agricultural Policy Committee, responsibility for the maintenance of the Queen's Park and Pastures was assumed by the Acting Curator which post continued to be filled by Mr. R. E. Dean in addition to his substantive post of Manager, St. Augustine Station.

170. The grounds of the Royal Botanic Gardens, the Queen's Park Savannah and those Government Compounds under the control of the Department were maintained in a satisfactory condition during the year, the purchase of a new tractor and gang mower greatly facilitating this work in respect to the Savannah.

171. In co-operation with the Social Welfare Department and with various other organisations, a revised lay-out of pitches for organised games on the Savannah was prepared and adopted. The scheme has not only resulted in an orderly lay-out but has provided additional pitches.

172. *Tourist Pavilion.*—The construction of the pavilion on the site of the 'old cottage' at the western entrance gate to the Royal Botanic Gardens to provide for an information and guide service to visitors was completed early in the year, and has been staffed by personnel of the Tourist and Exhibition Board. Construction of a car park, and the widening of the entrance roads, was undertaken by the Public Works Department.

173. Amendments to the Royal Botanic Gardens' Regulations providing for the sale of refreshments at the Pavilion, and new rules governing the conduct and operation of guides within the Gardens were approved.

Experiment Work and Specialists' Reports

Central Experiment Station

174. The Chief Scientific Officer, Dr. E. Phillis, reports on the work of the Central Experiment Station and summarises the work of the Specialist Officers as follows :—

175. The Central Experiment Station of the Department of Agriculture owes its origin to a recommendation made by the Agricultural Policy Committee of Trinidad and Tobago in 1943. A block of land was acquired at the eastern end of the Caroni plain, which was extended by subsequent additions to some 2,500 acres. This area includes some of the Caroni terrace soils, which are at present notoriously unproductive, as well as the clays of the flood plain. Much of the latter area was originally under cocoa, which bore well in the past but which has suffered in recent years from the general 'decline' which has affected the island, as well as from Witches' Broom. The area also included several blocks of citrus, both orange and grapefruit, which were in a neglected condition. Approximately one-third of the area was let out for food gardens during the war period.

176. There was very little development of the Central Station during the year other than planning. An old estate house has been repaired and will serve as a centre for the Station until more permanent buildings are erected. Several derelict buildings including stables, cocoa houses and store sheds were demolished and all usable material salvaged. A new stable was built from this salvaged material.

177. The Policy Committee suggested that the main aim of the Station should be to develop more stable systems of agriculture, based on mixed farming, and so the earliest constructive project of the Station has been to assemble as many types of grasses and fodder crops as were available in Trinidad and to try them out under Central Station conditions. Several of the imported grasses show promise, notably the Elephant grass strains. A form of Guinea grass known as Colonial grass, which has shown much promise in other parts of the Colony has been very dispppointing at the Central Station in that it produced very little foliage, but flowered freely. Legumes, on the whole, with the exception of *Indigofera endocaphylla*, have done very badly on the terrace soils. Adlay and other cereals including the millets were not very successful.

178. All these soils are low in humus content, and it may well be that cover crops for discing in or for feeding to animals with the return of the manure to the soil to help build up further crops will be an essential part of the reclamation process.

179. One of the major problems of the Central Station will undoubtedly be weed control. At present, the area remaining under cocoa is covered with 'Blackstick' (*Pachystachys coccinea*) which has the reputation of being an undesirable weed in cocoa plantations. Attempts to destroy this weed with Methoxone proved unsuccessful. Even very light dressings caused the softer parts of the plant to die off very quickly, with marked swelling of the nodes, but this effect in no case descended to ground level, with the result that the plant soon sprang up again from new shoots. Even when 'Blackstick' was cutlassed close to the ground, allowed to send out new shoots and then treated with Methoxone, only the younger parts, and not the established root system, were destroyed. Methoxone has in general proved of little value in weed control in Trinidad. Only the softer weeds such as Water grass (*Commelina eleganas*) and Cockroach grass (*Zebrina pendula*) are effectively destroyed. It has been shown elsewhere that Nut grass (*Cyperas rotundus*) which may be a pest in cultivated lands, can be eradicated with Methoxone, but experience here has shown that, while eradication may occur in some instances, it is far from general. Besides its inefficiency in controlling weeds under cocoa, the use of Methoxone in such conditions has the further disadvantage that it destroys young, soft cocoa shoots.

Cocoa

180. Attractive prices for cocoa during the latter half of the year stimulated interest in winning whatever cocoa could be obtained, and there was a general cleaning up of many—particularly abandoned—cultivations. It is regrettable, however, that the enthusiasm for reaping did not extend to rehabilitation. The Cocoa Propagating Stations at La Pastora and Marper, and at King's Bay in Tobago were all in operation. The Marper propagators are devoted entirely to Witches' Broom resistant material, which is not yet sufficiently tested for general release. The other two propagators produced approximately a quarter of a million rooted cuttings, but two-thirds of these remained on our hands owing to the unexpectedly low demand. In many cases, planters made no preparation for replanting, or substituted at the last a reduced planting programme ; it was generally stated that the subsidy was quite inadequate to meet the high cost of labour. Labour was also scarce in some districts. It is to be regretted that the plants already sent from the propagators (90,000 in 1945 and 70,000 in 1946) served to replant only 400 acres out of an estimated cocoa acreage in the region of 150,000 acres. As this report is being written, a Committee has been appointed to advise on steps for stimulating the rehabilitation programme.

181. Witches' Broom continues to be a serious menace over most of the island, and it is clear that large areas should not be replanted until Witches' Broom resistant varieties are available. Varieties have been selected which promise well for resistance and yield. Samples of cocoa prepared from mixed Witches' Broom resistant clones were sent to England for appraisal of quality. They proved to be almost, if not quite, equal to Standard Trinidad Mixed Estate Cocoa, and should be acceptable to the trade.

182. An experiment on the control of Witches' Broom by spraying at frequent intervals with Bordeaux Mixture proved disappointing in that the spraying did not prevent broom formation.

183. The incidence of Witches' Broom in Tobago did not change appreciably in the course of the year.

184. The virus disease of cocoa first noted in 1941 has been a major object of concern during the past year. Preliminary surveys suggested that the virus was confined to the North-western part of the Island. South of this area, lies the cane belt which may be assumed to be cocoa free. It was decided to attempt to find the eastern limits of spread of the disease and to attempt to hold it in check by cutting out all infected trees on the eastern boundary of spread. The search for this eastern limit still continues.

185. It can now be said that the disease is almost, if not entirely restricted to the North-western corner of the Island. Estimates based on the rate of spread and on virus incidence on plants sent out from River Estate suggest that virus first appeared in the Island between 1925 and 1930. It would appear where infection is not very dense, that the number of trees affected approximately doubles per annum. Most spreads appear to result from direct contact, but there are inexplicable jumps of up to half a mile and perhaps even further.

186. The main Propagating Station lies in the midst of a heavily infected district. As it was considered of the utmost importance that plants distributed from this centre should be virus free, all cocoa within a mile of the Propagating Station has been cut down. The trees were felled by cutting both the main roots and the bole below ground level. Owners have been compensated only for non-infected trees in the cleared area.

187. The effect of virus on yield and longevity of cocoa trees is still under investigation and much more data will be required before a satisfactory answer can be arrived at. It is becoming evident that all types of cocoa are not affected to the same extent and that earlier reports of the drastic effects of virus on yield generally require further examination.

188. One of the main requirements for cocoa research at the present is a method of fermenting small samples of cocoa which will give results similar to those obtained with large scale fermentation. It is comparatively easy to ferment small samples so that all the physical characteristics of good fermentation are obtained, but such samples seem to have lost much of their flavour. Some preliminary work has indicated that aeration may be a very important factor. Work on these lines is proceeding.

189. A perplexing problem concerned with rehabilitation is that established old cocoa in general fails to respond to applied fertilisers. Root studies on cocoa show that usually there is a layer of feeding roots in or on the surface of the soil and that such layers are most pronounced where there is a good litter deposit on the surface. It may be that fertilisers are rapidly removed from this surface layer and so are unavailable to the plant. Experiments are now in progress in trying various types of surface mulch with and without added fertilisers. Indication to date is that mulches have a beneficial effect.

Cane

190. The new cane varieties produced at the British West Indies Central Sugar Cane Breeding Station in Barbados are rapidly ousting the older varieties. Five years ago B.H.10(12) and Uba occupied 56 and 17 per cent. respectively of the total cane area. Now they occupy only eleven and three per cent. whereas two Barbados varieties B.34104 and B.3337 occupied almost 50 per cent. in the past year. Given an early start, B.34104 can give excellent yields on light soils, but when planted towards the end of the wet season, it suffers severely from drought in the following dry season.

191. Experiments on the quantity of cane used as planting material have shown that there is an optimum density, and that to go above this level means only wasted cane. Cane laid in the furrow gave no greater response than setts planted in the normal manner, provided they were not more than 18 inches apart. When the setts were 2 feet or more apart, there was a significant reduction in yield. With furrows five feet apart across a 22-foot bed, the numbers of double plants across the bed, ranging from five to eight, had no effect on yield.

192. The use of phosphatic fertilisers is likely to be greatly increased as a result of experiments carried out by the Ste. Madeleine Sugar Company, Limited. Certain soils which do not respond to phosphate applied in the usual broadcast manner show marked response to medium applications of superphosphate (3 cwts./acre) when the application is localised.

193. Experiments on the form in which nitrogen is applied either as ammonium sulphate or as ammonium nitrate have shown no difference between the two forms.

194. The soil survey of the sugar belt made good progress during the year. The sugar soils of the northern basin have been examined in sufficient detail for the production of soil maps.

195. Froghopper blight was not particularly widespread during the year; damage was least in the central area. A method of forecasting the intensity of first-brood emergence of froghoppers has been developed by estimating the number of froghopper eggs in the soil during the dry season. This number is correlated with the intensity of emergence, and where excessively high populations are found, it would seem advisable to plough up the land during the dry season in an effort to eliminate centres of intensive breeding.

196. There has been intensive field work on the control of froghopper with the aid of the newer insecticides such as D.D.T. and Gammexane. The result to date are distinctly promising. Briefly it may be stated that D.D.T. appears to be better than Gammexane, largely because of its marked residual effect. Wettable D.D.T. powders appeared superior to ordinary D.D.T. dusts, while both were better than the technical grade. Sabadilla produces a satisfactory mortality when used at or after the peak of adult emergence, but a single application does little to check the progress of an infestation which is increasing rapidly at the time of application. Like Gammexane, Sabadilla has no appreciable residual action.

197. There were no outbreaks of pathological disease in cane during the year. A regular patrol is kept up against mosaic and in the few cases noted the infected stools were destroyed.

Citrus

198. Easier labour and transport conditions encouraged greater attention to grapefruit during the year. On most estates, considerable dieback and marked leaf symptoms are evident. Experiments have been started on an established field at the Central Experiment Station on the control of leaf symptoms through mineral nutrition. In common with general Trinidad experience, nitrogen in the form of ammonium sulphate has caused a marked general improvement. A response has also been obtained with zinc sprays. A severe decline on one estate in the Northern Range has been arrested and reversed by cutting out phosphate from the fertilisers normally added, and increasing the amount of nitrogen supplied. Yield, which had been decreasing for several years, has approximately doubled under the treatment.

199. Grapefruit and orange trees on the Central Experiment Station had been neglected for several years, and one result of this neglect was that ants had occupied almost every tree. Most of the trees showed much dieback, blackened foliage and massive nests hanging from the lower branches. These ants were particularly difficult to eradicate owing to the large number of small nests along the branches. Destruction of the main nests with fumigants such as Cyanogas, or with carbolic-paraffin sprays did not offer a permanent cure, nor did breaking the nests away from the trees and destroying them on the ground. In the end the following method was found to be effective. As many as possible of the nests are broken away from the trees and put in the nearest drain. The tree is then pruned so that air and light can reach the trunk and both trunk and larger branches are frequently brushed with a stiff broom to discourage ants from building again. Once the trees are freed from ants there is little tendency for them to return.

200. In another part of the Colony, an unusual pest in the form of snails did considerable damage to citrus trees. These snails which are active only in wet weather strip the bark from young wood, resulting in wholesale shedding of fruit and the death of large parts of the affected tree. The most efficient means of control yet devised is to spray the tree thoroughly with Bordeaux oil emulsion, which causes the snails to fall to the ground, death ensuing some hours later.

201. Another unusual citrus pest has been noted particularly in the south-west peninsula. This is a Colonial Spider which forms colonies in trees and builds a heavy mass of web which completely constricts the tree and stops its growth. Heavily infested trees may be killed in two or three years. Control is difficult because of the difficulty in getting at the spiders through the massive web. The most satisfactory control so far obtained resulted from the use of D.D.T. from a high-power blower.

202. American experience is, on the whole, against the pruning of grapefruit trees, but it would appear that the form of the tree is very different in America from that found here. An experiment on pruning has been commenced. The general idea guiding pruning was to lift the skirts of the trees and to clear out the centre so that light and air could get to the trunk. Interlacing branches were removed, as was also all weak and spindly growth at the ends of the branches. The general appearance of the trees was greatly improved by the treatment, but, as might well be expected, yield was depressed in the first crop after pruning.

203. Limes continued to die out throughout Trinidad. The West Indian Limes Association is taking an interest in this common West Indian problem, and planters throughout the West Indies have been asked to send in answers to a questionnaire covering all phases of dying out. It is believed that a survey of West Indian experience may narrow the field for investigation considerably. In the meantime limited supplies of limes budded on to five stocks have been distributed to certain planters in the Colony so that some information as to the behaviour of these various stocks may be obtained. Observation trials with fertilisers have also been started on four estates.

204. There were no serious outbreaks of pathological disease on citrus during the year.

Coconuts

205. An appreciable increase in the price of copra has stimulated interest in coconuts. Much of the leeway in cultivation due to neglect throughout the war years has been made up. Interest is now being taken in the use of fertilisers for increasing crops and three estates are running fertiliser trials. There is interest also in improved planting material. A scheme proposed by the Department for improving the seed nuts through careful selection was generally accepted and several planters are now searching for high yielding palms. On one estate, the yield per tree for some 800 palms is being recorded.

206. Bronze leaf wilt is still to be found in various parts of the island and is rather accepted as a matter of course. Casual observation suggests that ' Red Ring ' caused by nematodes, is on the increase. At a rough estimate it would appear that about a third of all coconut supplies now put in die of ' Red Ring ' before they reach maturity.

Rice

207. Some 20,000 acres of rice are grown in the Colony, entirely by peasants. Average yields appear to range between 12 cwts. to 1 ton per acre. There is little attempt at seed selection and consequently the paddy produced is very mixed. Fertilisers and manures are rarely if ever used. A start was made on a rice selection programme by collecting a dozen local varieties through the Extension staff, and small plots were grown from the seed on the St. Augustine rice fields. As anticipated, the samples were far from pure. Good yields were obtained, averaging nearly two tons of dry paddy to the acre, and selections were made from these plots for further trials this year. It is clear that there is in general considerable room for improvement both in seed supply and in the manner in which it is grown.

Vegetables

208. Cabbage seedlings showed losses from mildew (*Peronospora parasitica*). This disease, which is apparently air borne, attacks the seedlings at such an early age that standard fungicides cannot safely be used, owing to phytocidal effects. The only fungicide with which any success was obtained was Shirlan W.S., at a concentration of 0.25 per cent.

209. Bacterial rots also played their part in reducing the cabbage crop. It is possible that the incidence of these diseases may be correlated with the intensive or repeated use of the same land for cabbage culture.

210. Rotation experiments undertaken to determine whether bacterial wilt disease of tomatoes could be controlled by suitable crop rotations have shown that there was less disease where tomatoes followed cauliflower as opposed to tomato following melongene (*Solanus melongene*) or tomato.

211. Experiments on the effects of manurial treatment on pawpaw ' mosaic' proved inconclusive, but did show, in spite of the effects of mosaic, that very heavy yields could be obtained as a result of manuring.

212. Wastage of sweet potatoes shipped from Tobago to Trinidad attained serious proportions during the early months of the year. Changing the conditions under which the potatoes travelled from Tobago to Trinidad did not effect any reduction of disease, nor did fungicidal treatments on arrival in Trinidad. It became evident that the potatoes are infected when lifted from the ground, and that attempts to control the disease must begin in the field. One recommendation is that attempts should be made to avoid a succession of sweet potato crops on the same ground.

213. The individual reports of the following Specialist Officers follow.

Entomology

214. The Entomologist, Mr. A. Pickles, reports as follows :—

Sugar Cane

215. Investigations on the sugar-cane froghopper and its control continued to be the major activity of this Division during 1946.

216. Froghopper injury was not particularly widespread during the wet season and little blight occurred in the central area. Damage was more intense in northern and southern districts and was perhaps most marked at Caroni Estate. About 490 acres were blighted by the first froghopper brood, over 2,000 acres by the second and about 1,500 acres by the third.

217. During the dry season, a quantitative survey of the distribution of froghopper eggs in the soil of selected cane fields was conducted at Woodford Lodge Estate in the course of which some eighty fields were examined. In fifteen of these, excessively high egg populations were discovered and the fields were ploughed in the dry season in an effort to eliminate centres of intense froghopper breeding. In the remaining fields which were left in cultivation, first-brood emergence of froghoppers followed closely the indications of the survey, from which it is concluded that infestation would have been extremely severe in the remainder had they not been ploughed. An account of the techique employed in this work was published in the *Proceedings of the Agricultural Society of Trinidad and Tobago*, Vol. XLVI, Part I, pp. 75-83.

218. Insecticidal control of the froghopper was studied in detail under field conditions at Woodford Lodge Estate and, to a smaller degree, at Ste. Madeleine ; thanks are due to the managements of the estates concerned for their co-operation, assistance and hospitality. The insecticides tested were Sabadilla, D.D.T. and Gammexane ; the relative value of the different insecticidal treatments was assessed by study of the populations of the infested fields, both before and after treatment, using a technique already described. The results of the numerous experiments conducted are somewhat difficult to summarise, but it may be said that D.D.T. remained the best single insecticide yet used for this purpose.

219. Several proprietary brands of D.D.T. were employed, including "Technical" D.D.T., specially prepared dusting powders and wettable preparations of D.D.T., all applied as dry dusts after dilution with an inert carrier. The performance of wettable D.D.T. and of the dusting powders was, as might be expected, much more satisfactory than that of "Technical" D.D.T. Some indication was obtained that wettable powders were superior in performance to ordinary D.D.T. dusts. In all cases, however, the residual effect of D.D.T. was most marked and is the most valuable property of the insecticide for the purpose under reference.

220. Sabadilla was found to have little or no residual effect and, while this insecticide produces a satisfactory apparent mortality when used at or after the peak of adult emergence, a single application does little to check the progress of an infestation which is increasing rapidly at the time of application.

221. Gammexane appears to be appreciably more toxic to adult froghoppers than is Sabadilla and, in several of the experiments, immediate apparent mortalities of 96-98 per cent., were obtained with preparations containing 0.5 per cent. of the gamma-isomer of benzene hexachloride applied at the rate of 40 pounds per acre. At this concentration, however, no residual effect is exhibited. Preparations containing 1.0 per cent. of gammexane applied at the same rate per acre showed a suggestion of residual effect which requires confirmation.

222. In the course of the work, the nature of the diluent employed with D.D.T. and with Sabadilla received attention. It was found that local pulverised limestone was satisfactory for this purpose and its use in place of imported sulphur has accordingly been recommended.

Citrus

223. For some years past, grapefruit has been injured in small scattered localities by a weevil not yet identified. In 1936 the insect was present in greater numbers than previously and over a much wider area and caused serious damage. The weevil attacks the young, soft foliage soon after the commencement of the rains, by eating the margins of the leaves; replacement of the damaged foliage is slow and this partial defoliation in the early stages of fruiting appears to have a markedly depressing effect on the subsequent crop of fruit. Later flushes do not appear to be susceptible to attack and the insects responsible for the injury are only in evidence for two to three weeks. Little attempt at control of the pest has yet been possible owing to the extremely short period during which the insects are active, to the scarcity of spraying or dusting equipment on citrus estates and to the common practice of keeping bees in citrus plantations which restricts the use of the common insecticides.

224. Arboreal snails were found to cause severe injury to both oranges and grapefruit in one locality. The snails remove long strips of bark from the young wood to such an extent that fruiting stems and even fairly large branches may become completely stripped, such injury culminates in wholesale shedding of fruit and the death of large parts of the affected tree. Control of this unusual pest is difficult as the snails are well-concealed during the day and are not susceptible to many of the ordinary sprays. Baits of metaldehyde are effective in wet weather when the snails are most active, but it is a matter of difficulty to dispose the baits in those parts of the tree frequented by the snails. The most efficient means of control yet devised is to spray the trees thoroughly with Bordeaux oil emulsion; this causes the snails to fall to the ground after a few minutes and death follows some hours later.

225. Colonial spiders have been injurious to limes, oranges and grapefruit on an extensive scale, particularly in the south-western peninsula of Trinidad. Infestation begins in neglected or abandoned properties and gravid female spiders are windborne from one tree to another and in this way new colonies are formed. Injury to the affected trees arises from foliage and growing points being tightly bound in a mass of web in consequence of which growth is stunted and abnormal in form and heavily infested trees may be killed after two or three years. Experimental work on the pest has shown that insecticides applied from hand-operated equipment will not control the spiders as the insecticide is deposited on the outermost layers of web and does not come in contact with them. Successful control has been accomplished by the following methods: (*a*) Fumigation with Hydrogen Cyanide under a tent; (*b*) application of Gammexane smoke; (*c*) dusting with D.D.T. from a high-power blower. The last mentioned method is the most satisfactory since Cyanide fumigation is expensive and slow and Gammexane smoke is difficult to direct under ordinary field conditions.

226. Scale insects are seldom serious pests of established citrus plantations but may be extremely troublesome in nurseries and young cultivations: The extension of citrus cultivations at St. Augustine Nursery has called for routine methods for the control of scale insects on this host especially of *Lepidosaphes gloveri, Chrysomphalus ficus* and *Saissetis oleae.* Spraying of nursery stock at intervals of three or four weeks with either home-made dieselene emulsion or with proprietary oil-emulsion had given satisfactory results.

227. Towards the end of the year several complaints were received of "fruit-fly" attack on the ripening fruits of orange and grapefruit. It may be emphasised that injury to citrus fruit in Trinidad by "fruit-fly" is exceptional and most of the cases attributed to this cause are due to attack by the larvae of a moth. Several species appear to be involved of which *Laspeyresia* sp. is perhaps the most abundant. While the injury may be locally severe, the total quantity of the Colony's fruit so damaged is small and efforts at control should probably be directed towards eliminating wild host plants rather than to direct control by means of insecticides. The known hosts of *Laspeyresia* include hog plum, *pois doux* (Inga. sp.) and sour orange.

Food Crops

228. Experiments were continued on the control of *Hellula phidelealis* on cabbages and cauliflowers with the especial object of testing the use of Gammexane as a control for this pest. The insecticides used were Gammexane, Lead Arsenate and Cubé powder, which were compared with each other and with the effect of no insecticidal treatment. Significant differences in yield according to the treatment were obtained and the mean results, expressed as pounds of marketable cabbage per acre and as market value per acre were as follows :—

No treatment	3,245 lb.	($ 650.00)
Gammexane	4,922 lb.	($ 950.00)
Cubé	7,906 lb.	($1,580.00)
Lead Arsenate	8,799 lb.	($1,760.00)

Bee-Keeping

229. The following is a summary of a report submitted by Mr. E. A. Emond, Inspector of Apiaries.

230. During the year twenty-three Bee-Keepers registered their apiaries making the total of registered apiaries two hundred and thirty with a total of two thousand, seven hundred and ninety-four colonies on the Register.

231. Weather conditions were favourable to honey production and good yields were obtained in most areas. According to annual returns received, production was found to be 132,940 pounds.

232. It is encouraging to be able to record that the continual increase in the local consumption of honey has enabled Bee-Keepers to dispose of their entire crop at satisfactory prices rising to as high as $8.00 per four gallon tin (56 lb.)

233. The production of beeswax for the year was 2,180 lb. The prices paid for beeswax are satisfactory and if full advantage is to be taken of these opportunities Bee-Keepers must continue giving serious attention to improvement both in quality and quantity of wax for the local trade.

234. On the west side of the demonstration apiary at the St. Augustine Station an extracting house is now completed : this will also serve as a store-room for all equipment. These added facilities were greatly needed and mean much for instruction and any class work to be carried on at the station.

235. Efforts are now being made to establish a small queen rearing section to this apiary with the object of distributing queens to Bee-Keepers for the improvement of their stock. Orders for queens and small three-frame hives have already been received from several Bee-Keepers. It is gratifying to be able to record definite responses and keen interest which Bee-Keepers are showing.

236. During the year two small apiaries were established on departmental sub-stations, one at La Pastora and the other at Brooklyn Land Settlement. These colonies are headed by young queens bred at this station. Instruction and demonstration are given to settlers and others interested from time to time. Both apiaries are working satisfactorily.

237. During the year, no cases of diseases were found in colonies inspected but during the rainy months some Bee-Keepers suffered small damage caused by the Wax Moth (*Galleria mellonella*). As far as possible, the infected material was collected and destroyed in an effort to prevent further spread of the pests.

Plant Pathology

238. The Plant Pathologist, Mr. C. A. Thorold, reports as follows :—

Cocoa Virus

239. The attempt to control this disease has been a major consideration during the year. This objective has required a survey and census of affected trees.

240. The presence of virus infection is not always obvious because in certain trees the symptoms tend to be suppressed, especially when there is no " flush " of young leaves. In these circumstances, the most certain procedure for immediate eradication of virus is to destroy all cocoa trees in the infected area.

241. The main Cocoa Propagating Station is in the Santa Cruz Valley, where cocoa virus is prevalent. It was considered to be of the utmost importance that there should be no virus in close proximity to the nurseries and propagators of this Station, therefore, it was decided that all cocoa should be destroyed within an area extending up to about one mile from the Propagating Station as centre.

242. More than 200 acres of cocoa in private ownership were implicated, as being within the area specified above. A census of all cocoa trees and a survey of the affected ones were first undertaken in the Santa Cruz Valley. It was agreed that compensation should be paid for healthy trees only. Accordingly, with the assistance of the valuers of the Land Acquisition Branch of the Crown Lands Department, compensation was assessed and the owners reimbursed accordingly.

243. The procedure adopted for the destruction of cocoa, has been to fell the trees by cutting the main roots and bole below ground-level. The destruction of all existing cocoa around the Propagating Station will be completed early in 1947.

244. In other areas, where the complete elimination of all virus is not of such immediate or supreme importance, the policy adopted is to destroy only those trees which show virus symptoms. It is anticipated that a later search will be necessary to locate and destroy new infections, or affected trees which were unavoidably overlooked at the first inspection.

245. Although cocoa is continuous from west to east in the northern part of Trinidad, south of this, there is a belt where practically no cocoa is grown, separating the northern area from the cocoa in the centre of the island. It is believed that virus disease is confined to the north-western part of Trinidad. The present policy is to circumscribe and if possible reduce the virus area by searching for and destroying diseased trees in the northern and eastern extremeties of the affected region.

Witches' Broom Disease

246. Through the generous co-operation of Mr. Linton Gibbon, experiments have been undertaken in the Mausica area, to ascertain whether Witches' Broom disease could be controlled by frequent applications of fungicide. The results were disappointing, in that a few brooms were found on trees which received regular weekly applications of Bordeaux Mixture throughout a period of 18 months. It had previously been found that less frequent applications also gave only partial control, therefore, it is evident that spraying is not an effective control measure against Witches' Broom disease.

247. In Tobago, groups of 50 cocoa trees in various parts of the island have been kept under constant observation to determine whether there was any important change in the incidence of Witches' Broom disease as a result of the abandonment of control measures previously undertaken by the Department of Agriculture. The results obtained, supported by general and casual observations, indicated that the Witches' Broom disease situation had not changed appreciably in the course of the year.

248. A locally severe incidence of algal disease (*Cephaleuros mycoidea*) occurred on young cocoa in the Montserrat district during the ' rains '. A single application of Bordeaux Mixture assisted the recovery of affected plants, which were benefited also by improved climatic conditions later in the year.

249. Cases of pink disease (*Corticium salmonicolor*) continue to occur in the Mausica area. It was shown that complete control of this disease can be obtained by spraying with 1 per cent. Bordeaux Mixture. It seems that two spray applications per year may be sufficient, provided that attention is given periodically to the removal of affected branches.

250. Observations were made on the incidence of dieback disease, throughout the experiments on the effects from weekly and fortnightly spray-applications. There was no control of the dieback. therefore, it was concluded that this disease was not due to pathogenic infection of the aerial parts of the plant. There is no evidence that trees with dieback are also suffering from root disease, therefore, it must be supposed that the dieback is a physiological disease although the particular, adverse factor responsible has not been ascertained.

Sugar Cane Mosaic Disease

251. Regular inspections of sugar cane for the presence of mosaic disease were maintained, affected stools were dug and destroyed.

Citrus

252. There were no serious disease outbreaks on citrus crops during the year. Cases of grapefruit scab (*Elsinoe fawcetti*) occurred, but this disease was not anywhere severe. Thread blight (*Corticium sp.*) was prevalent locally during the ' rains ', special control measures were not required.

Sweet Potatoes

253. The loss of sweet potatoes during shipment from Tobago was serious during the early months of the year. This wastage appeared to be due mainly to black-rot disease (*Ceratostomella-fimbriata*). Experiments were undertaken to determine whether some of this loss could be prevented by consigning the potatoes in crates, instead of in the customary bags. However, there was found to be comparatively little advantage to be gained through crating. A comparison of storage in the ' hold ' as contrasted with ' tween decks, gave no indication that there was opportunity for reduction of disease by such alterations of storage conditions on the voyage from Tobago.

254. Experiments were undertaken to determine whether losses could be reduced by treatment after the voyage. In view of the extent to which the potatoes were generally affected on arrival in Trinidad, it was not to be expected that there would be much benefit from surface treatment, and none was found. Potatoes with black-rot were divided into five lots, each of which received a different treatment before rebagging: (*a*) dusted with sulphur; (*b*) dusted with hydrated lime; (*c*) dipped in ' Perenox ' solution and allowed to dry; (*d*) exposed to sun and air for two hours; (*e*) retained in bag. Although there appeared to be some improvement from treatments (*a*) and (*d*) in the first trial, these benefits were not reproduced in later experiments, therefore it was concluded that none of these experimental treatments was likely to be of sufficient value to warrant large-scale trials.

255. It is evident that the potatoes are already affected when lifted from the ground, therefore, attempts to control the black-rot disease must begin in the field. It is to be expected that the avoidance of successive crops of sweet potatoes on the same land will be a valuable control measure.

256. Sweet potato ' vines ' in at least one locality were affected with ' white rust ' (*Albugo ipomoea—panduranae*), but this disease does not appear to be of any economic importance.

Vegetables

257. There were considerable losses of cabbage seedlings from ' mildew ' (*Peronospora parasitica*) in market gardens at Aranguez and Diego Martin. This disease was apparently due to infection by air-borne spores, because neither seed nor soil treatment was effective in controlling it. The seedlings may be attacked at such an early stage that ordinary fungicides, such as Bordeaux Mixture, or ' Perenox ', cannot safely be used, because they are liable to be phytocidal to seedlings in the cotyledon stage. In later experiments, Shirlan W.S. (*Sodium salicylanilide*) was found to be effective when applied daily at 0.25 per cent. concentration. The Shirlan was phytocidal at 1 per cent. strength but only slightly harmful at 0.5 per cent.

258. Soft-rot (*Erwinia carotovora*) and black-rot (*Xanthomonas campestris*) diseases are responsible for considerable losses in cabbage cultivations. It is probable that a high incidence of these bacterial diseases is associated with too frequent *brassica* crops on the same land. Black-rot is known to be a seed-borne disease, therefore, an experiment was undertaken to determine whether treatments of cabbage seed with " Agrosan " dust would improve yields and reduce such diseases.

259. Rotation experiments have been undertaken to determine whether control of tomato bacterial wilt disease (*Xanthomonas solanacearum*) could be achieved by suitable crop successions. It was found that there was less disease and better yields when tomato followed cauliflower as opposed to tomato following melongene (*Solanum melongena*) or tomato. It is believed that complete control of the disease by avoidance of a *solanaceous* crop is impracticable, because certain weeds are likely to maintain the causal bacteria in the soil, in the absence of susceptible crops.

260. The roots of lettuce plants at the St. Augustine Experiment Station were found to be severely affected by root knot (*Heterodera marioni*). Therefore, an area of land where this disease occurred was used for experiments to observe whether certain leguminous crops, which are said to be resistant, could be used to rid the land of nematode infection. It was found that there were fewer root-knots on lettuce plants after several crops of either of two introduced cow-pea varieties ' Brahman ' and ' Iron ' as opposed to lettuce following local cow-pea ' Black-eye ', or successive crops of lettuce. However, the reduction in the incidence of nematode infection in this way did not appear to be sufficient to warrant the use of such ' resistant ' crops as an effective control measure against root-knot nematodes.

Pawpaw

261. Experiments have been undertaken to observe the effects of manurial applications on pawpaw (*Carica papaya*). It was desirable to know the extent to which yields could be enhanced and at the same time to determine whether the incidence of ' mosaic ' disease could be reduced by improved soil fertility. The treatments employed included ' complete ' artificial fertiliser coconut meal and pen manure at rates of 1 ton, 5 tons and 10 tons respectively per acre. In addition, there was a smaller observation plot where pen manure was applied at a rate of about 40 tons per acre. It was found that there was no reduction in the incidence of ' mosaic ' disease through any of these manurial treatments, therefore, it was concluded that , mosaic ' is not a ' deficiency disease ', as has been suggested. Yields of fruit were significantly and economically increased by the manures and fertilisers used in these trials.

Rum Vat Yeast

262. Only two meetings of the rum Vat Yeast Committee were held during the year, on 23rd January and the 18th April, respectively, the Chairman, Captain H. V. M. Metivier, being absent from Trinidad on vacation leave from May to December. Dr. J. Duckworth relinquishing his appointment at the Imperial College of Tropical Agriculture, ceased to be a member of the Committee.

263. Considerable attention has been given to the possibility of obtaining a waste yeast with a lower mineral content than that which is generally characteristic of the rum vat yeast which is obtained by drying ordinary rum vat ' sludge '. Mr. P. J. Knox, who is a member of the Committee, has now succeeded in producing from the ' sludge ' a waste yeast of which the ash content on a dry-weight basis is about 14 per cent. instead of its being as high as 20 per cent to 30 per cent. when no special precautions are taken. It is evident that purity of the water used in ' setting ' the vats is an important pre-requisite to a purer waste-yeast.

264. At the suggestion of Dr. Duckworth, arrangements were made for vitamin B1 assays of yeast samples. It was desirable to know whether there was a loss of this vitamin during storage of the yeast. Samples of dry rum vat yeast were submitted to Food Research Laboratories Inc., who kindly undertook the determination of thiamine (B1) by the thiochrome procedure. The samples were first assayed on 21st September and then subsequently on 5th November, corresponding to a period of six weeks between the two determinations. It was found that there was a deterioration in vitamin content during this period. At the first analysis the mean thiamine content was 9.42 mcg. per gram. at the time of the second analysis the mean thiamine content was 6.86 mcg. per gram.

265. Of specimens submitted for determination during the year, amongst those identified, the following appear to be new records for Trinidad :—

Arcyria cinerea var. digitata, on dead wood
Arcyria ferruginea do.
Arcyria incarnata do.
Stemonitis ferruginea do.
Pullularia pullulans, isloated from rum vat yeast.

266. Grateful thanks are due to the Directors and their staffs at the following institutions, for assistance and advice :—

The Imperial Mycological Institute,
The Royal Botanic Gardens,
The Northern Regional Research Laboratory of the United States Department of Agriculture.

Cocoa Agronomy

267. The Cocoa Agronomist, Dr. B. G. Montserin, reports as follows :—

Cocoa Rehabilitation

268. Attractive prices for cocoa during the latter half of the year somewhat revived the interest of many proprietors as evidenced by the general cutlassing of a large number of formerly neglected cultivations. It is regrettable, however, that with a few notable exceptions, the progress made in rehabilitation during the year was considerably below expectations. Only 50 per cent. of the applicants made adequate preparation for replanting, while deliveries were less than one-third of what was anticipated. In most cases where no preparation was made or where a reduced programme was substituted it was claimed that the scarcity and high cost of labour limited the necessary operations.

269. New applications for Cocoa Subsidy under the Rehabilitation Scheme amounted to 24 in respect of two hundred and thirty-four acres, to be replanted in 1947. Previously one hundred and ninety-two applications were received for replanting nine hundred and ten acres.

270. During the 1946 planting season 70,000 I.C.S. (heavy bearing) cuttings were distributed throughout the Colony. Added to the previous year's distributions of 90,000 this gives a total of 160,000 I.C.S. cuttings utilised in replanting approximately 400 acres of cocoa.

271. At the La Pastora and King's Bay Cocoa Propagating Stations 240,000 cuttings of I.C.S. were produced, the average rooting for the year being 63 per cent.

Witches' Broom Resistant Clones

272. At Marper Farm, Witches' Broom resistant clones of local and South American origin were propagated in fair quantiy. Production of cuttings from the best yielders of these resistant clones amounted to over 8,000 most of which were utilised in the extension nurseries for supplying cuttings.

273. Three budded plants of a new clone were established at Marper Farm. This clone comes from Surinam (C.C. 7), is a heavy bearer, and proves resistant in Surinam where it was under observation for over 29 years.

Fermentation Trials

274. Several samples of clonal cocoa have been submitted to the Cocoa Research Panel for quality testing. At present it is not possible to obtain any of the clones for bulk fermentation in the sweat box. The samples of clonal cocoa so far submitted have been fermented in small quantities in the solar ray fermentary or in the electric incubator. The reports received on these samples indicate that in all instances there is lack of the chocolate flavour characteristic of normally bulk fermented Trinidad cocoa. Further attempts are being made to develop a technique for fermenting small quantities of cocoa which may compare favourably with the product of the sweat box.

Mulching and Manurial Trials

275. Observations are being made on the use of a grass mulch and coconut meal with and without artificial fertilisers on old cocoa at Marper Farm. Yield data for the first year indicate superiority of the plots which received fertilisers over those which received no fertilisers, and also of the mulched plots over the unmulched plots. These observations are being continued.

Simple Methods of Propagating Cocoa

276. Observations were made on several simple methods of propagating cocoa cuttings which may be used by the average proprietor without involving considerable expense. The following procedure was found to be quite effective, simple to operate and inexpensive: A wooden frame 3 ft. by 3 ft. and 2½ ft. deep, without a bottom and provided with a lid on which domestic cloth is nailed is all that is needed. The frame is placed beneath a shady tree so that direct sunlight does not reach it at any time of the day. A mixture of sharp sand and pulverised rotted immortelle wood in the proportion of one to three is a good striking medium. The mixture can be put into bamboo pots 8 inches high and 3-4 inches in diameter. Cuttings of young vigorous shoots 8-12 inches long which have just hardened but with the twig still green are used for striking. Two or three basal leaves are removed and the upper leaves are cut in half. The cuttings are set about 4 inches deep in the mixture, the pots are put into the frame and watered. The lid of the frame is put into place and wetted. Watering may be done with a watering can and is necessary once daily during the rainy season. Rooting take place in 4 to 6 weeks without the use of hormones with successes of 80-100 per cent.

Sugar Agronomy

277. The Acting Sugar Agronomist, Mr. R. Ross, reports as follows :—

278. The work during 1946 was mainly concerned with field experiments with cultural methods, with manures and with varieties.

279. This Division was responsible also for the inspection for cane subsidy of fields planted on the estates of Trinidad Sugar Estates Ltd., Woodford Lodge Estates, Ltd., and Caroni Ltd.

Field Experiments in Operation

280. Out of a total of 41 experiments to be reaped, 3 experiments remained unreaped due to unavoidable causes.

281. The effects of the treatments and varieties on yield of cane and sugar and on crop quality will be recorded in detail in ' Field Experiments on Sugar Cane in Trinidad '—Annual Report for 1946.

Planting Methods

282. With furrows along the bed no significant difference in yield was obtained as plant canes between planting long canes and planting short setts provided the setts were spaced twelve to eighteen inches apart along the furrow. When the setts were spaced 2 feet and 3 feet apart significant differences around 8 tons less per acre were obtained from both these spacing distances.

283. With furrows 5 feet apart across 22 feet beds no significant difference was obtained in yield either as plants, first or second ratoons by increasing the number of double plants across the bed from 5, to 6, 7 or 8.

Manures

284. Increasing the dressing of sulphate of ammonia from 6 to 8 cwts. per acre in one of the spacing experiments mentioned above led to no gain in yield whether applied to long canes or to setts spaced one, two or three feet apart.

285. No significant difference in yield was obtained between an application of 4 cwt. sulphate of ammonia and its nitrogen equivalent as ammonium nitrate when applied to B.H. 10(12) first ratoons nor between 3 cwts. sulphate of ammonia and its nitrogen equivalent as ammonium nitrate when applied to B. 34104 first rtaoons.

Varieties

286. There were 21 varieties under comparative test.

287. As a result of these trials, and from observations made in the field it seems that B. 34104 when planted early in the wet season can give excellent yields on light soils of the flat areas with fairly uniform texture down the profile. When planted towards the end of the wet season, however, this variety can suffer severely from drought in the dry season following planting. B. 37172 could profitably be used instead for this late planting and also on clay soils with structure. B. 37161 could profitably be more widely extended in the Naparimas and possibly on structureless heavy clays of the flat areas.

288. The variety B. 37193 should be extended to a small extent in bad froghopper areas in order to ascertain its resistance to and recovery from froghopper blight.

Varietal Distribution 1941-46

289. The distribution for the year 1941-46 went to show that B.H. 10(12) and Uba are being replaced by varieties introduced from the British West Indies Central Sugar Cane Breeding Station. In 1941 B.H. 10(12) and Uba occupied 56 and 17 per cent. of the total area reaped by estates. These figures fell to 11 per cent. and 3 per cent. in 1946, whereas B. 34104 together with B. 3337, another variety from Barbados, accounted for nearly 50 per cent.

Soil Chemistry

290. The Soil Chemist, Dr. E. M. Chenery, reports as follows :—

Field

291. Very good progress was made during the year on the soil survey of the sugar belt. All the sugar land of the Northern Basin on which operations were begun in 1945, has now been examined in sufficient detail for the production of soil maps.

292. The estates surveyed were as follows :—

(i) *Northern Range Detrital Belt :*—Imperial College of Tropical Agriculture, Macoya, Streatham Lodge, Maloney, Garden, St. Clair, Golden Grove, Dinsley, Valsayn, Aranguez, El Socorro, Barataria.

(ii) *Caparo Basin :*—Esmeralda, Edinburgh, Felicity.

(iii) *Couva Basin :*—Waterloo, Wyaby, Orange Field, Union, Perseverance, McBean, Camden, Rivulet, Caracas, Spring, Savannah, Brechin Castle, Sevilla, Milton, Carolina, Verdant Vale, La Carmelita.

293. Special investigations were made on the soils of Spring Hill Estate, Arima ; San Jose Estate, Lopinot ; St. Cite Estate, Diego Martin ; El Dorado Estate, Chickland ; Siparia Reserve ; Erin Savannah ; Icacos coconut estates ; Nariva Swamp ; Sangre Grande.

294. The total area covered by detailed Soil Survey operations was about 40,000 acres.

295. An examination of the sub-soil conditions of the runways at Carlsen Field, Chaguanas was made at the request of the United States War Department.

Laboratory

296. Four hundred and eighty soil samples were tested by routine methods during the year entailing about 3,000 separate determinations of chemical or physical characteristics.

297. Four samples of lime leaves were analysed in connection with the die-back problem.

298. One hundred and forty-four samples were handled in connection with the pasture experiment at the Government Farm.

299. At the request of the French Consul, 12 samples of soil from Martinique were tested for physical characters relating to suitability for air-strip construction.

300. Help was given to a local company in finding a deposit of sand suitable for glass making.

301. A method for the rapid determination of aluminium in the presence of excess iron was worked out and submitted for publication to an English chemical journal.

Veterinary

Proclaimed Diseases

302. The Deputy Director (Animal Husbandry), Captain H. V. M. Metivier, reports as follows :—

303. *Anthrax.*—Two suspected cases were reported during the year but on investigation proved to be negative.

304. *Swine Fever.*—The incidence of this disease has fallen considerably and only 32 cases were reported during the year in scattered areas : no cases occurred in Tobago. The pigs on both Stock Farms as well as all the Department's pigs in out-districts were vaccinated with Crystal Violet Vaccine: the Department also imported vaccine for carrying out protection in privately owned piggeries at a cost of 2/-, a charge of 2 shillings per animal, to cover the cost of the vaccine, being made.

305. *Equine Encephalomyelitis* (Sleeping Sickness) :—The Colony was again free from this disease during the year but a supply of vaccine was kept in stock to deal with any emergency.

306. *Paralytic Rabies* (Bat transmitted) :—Bat squads were maintained by the Health Department in the Colony and were moved around to areas whenever the incidence of bat biting increased, for bat destruction. Animals were inoculated against the disease in the Mayaro district where cases occurred in 1945. A few suspected cases were reported in County Caroni but the examination of the brain in each case did not show the presence of negri bodies.

307. *Rabies* (Ordinary) :—One case of suspected rabies in a dog was reported : the animal was isolated at the Quarantine Station but died from other causes as there were no negri bodies in the brain and animals inoculated also proved negative. The police again continued the work of rounding up all unlicensed dogs and the campaign was extended to country districts. All unclaimed dogs were destroyed. Twenty-six dogs including dogs intransit through the Colony were quarantined during the year.

308. *Tuberculosis.*—The herd at the Valsayn Farm was tested once during the year and there were 6 reactors amongst 450 head of cattle tested. At the Tobago Farm there was only one reactor.

309. The work of testing the dairy cattle in the rural districts around Port-of-Spain had to be postponed to the second quarter of the year due to the shortage of staff. A private Veterinary Surgeon was employed on a part-time basis in May and June to assist in this work. There were 5 reactors amongst approximately 1,200 animals tested.

Non-Proclaimed Diseases

310. *Laryngo-Tracheitis.*—There was an outbreak of Laryngo-Tracheitis amongst the poultry at the Trinidad Stock Farm and all the affected birds were destroyed and burnt ; the condition cleared up at the end of the year.

311. *Internal Parasites.*—Internal parasites were again responsible for stunted growth and mortality in young stock and owners, especially peasants, were advised, to drench their stock regularly with copper sulphate or Phenothiazine.

312. *Brucellosis in Cattle* (Contagious abortion).—The incidence of this disease, which occurs chiefly in the large dairies, continues to decline. It is intended to use the well-known vaccine (Strain 19) on young stock at the Government Farms in 1947.

313. *Mange.*—An outbreak occurred at the Trinidad Stock Farm's rabbitry and it was decided to kill off all the rabbits and to re-stock with clean animals. A few cases of mange also occurred in British Alpine goats on the Trinidad Farm but they responded to treatment.

314. *Granular Dermice Sores in Horses.*—This condition was seen in police horses imported from Canada and the matter was reported to Dr. Cameron of the Institute of Parasitology, MacDonald College, Canada. It is understood that investigational work on this disease is still in progress and the cause has not yet been determined. A similar condition is also seen in donkeys in the Colony and appears to be fly transmitted : where abrasion wounds on the limbs of animals are regularly treated and not left exposed the condition does not occur.

315. *Canadian Acne.*—Two cases occurred in police horses but yielded to treatment after a prolonged period.

316. *Strangles and Influenza.*—Owing to the increased number of mules imported by the Sugar Estates from the United States of America during the year the incidence of strangles was higher than in the past.

317. *Tetanus.*—With the better treatment of wounds about the feet of horsekind and the use of anti-tetanic serum and tetanus toxoid fewer cases were reported.

318. *Pneumonia and Diarrhoea* (in calves).—There was an out-break of pneumonia amongst young hand reared calves at the Government Stock Farm, Trinidad, with diarrhoea symptoms as well in some cases. The condition resulted from overcrowding and improved when more housing accommodation was made available. With the use of Sulfathiazole and Penicillin in these cases a considerable number recovered.

Staff Notes

319. The following vacancies were filled during the year :—

Economic Botanist on the 30th October, by the transfer from Nigeria of Mr. D. B. Murray.
Veterinary Officer on the 10th August by the appointment of Dr. J. G. B. Murray.
Agricultural Officer on the 1st April by the promotion of Mr. F. D. Davies, Senior Agricultural Assistant.

320. At the end of the year the following appointments were still unfilled :—

Sugar Agronomist	Assistant Sugar Agronomist
Citrus Agronomist	Agricultural Officer
Veterinary Officer	Soil Survey Officers (2)

321. Mr. J. C. Muir, Director, visited Washington, United States of America from 26th May to 8th June, together with Mr. J. Forbes of the Trinidad Cocoa Planters' Association in connection with representations concerning the price of cocoa.

322. From 19th July to the 26th July he visited Jamaica to attend meetings of the West Indian Limes Association.

323. Captain H. V. M. Metivier, Deputy Director (Animal Husbandry) proceeded on long leave to the United Kingdom on the 20th May and attended as official delegate, the Imperial Agricultural Bureaux Conference.

324. Mr. E. W. Leach, Deputy Director (Crop Husbandry) and Mr. A. Pickles, Entomologist, attended as official delegates the Annual Meeting of the British West Indies Sugar Technologists which was held in British Guiana from the 30th September to the 7th October.

J. C. MUIR,
Director of Agriculture.

2nd August, 1947.

SECTION III—PUBLICATIONS

Field Trials of Insecticides for the Control of the Sugar-Cane Froghopper.—(Tropical Agriculture, Jan., 1946, pp. 9-11)—Alan Pickles, Entomologist.

Address on Professor W. Miller's Report on Veterinary and Animal Husbandry Matters in Trinidad and Tobago.—(Proceedings of the Agricultural Society, March, 1946, pp. 49-64)—Captain H. V. M. Metivier, Deputy Director (Animal Husbandry).

Carrots.—(Proceedings of the Agricultural Society, March, 1946, p. 73)—Dr. F. J. Pound, Senior Agricultural Officer.

Estimation of the Number of Froghopper Eggs in Cane Fields Soil).—Proceedings of the Agricultural Society, March, 1946, pp. 75-83)—Alan Pickles, Entomologist.

A Note on the Storage of Trinidad Grown Cabbages.—(Tropical Agriculture, July, 1946, pp.120-121).—A. E. Trotman, Marketing and Co-operative Officer.

Bee-Keeping for the Planter and Fruit-Grower.—(Departmental Leaflet).—E. A. Emond, Inspector of Apiaries.

SECTION IV—LEGISLATION

	Date	References	Remarks
		AGRICULTURE	
Gazette Notice No. 32 Sugar Quotas Order 1946	5/ 2/46	Sugar Quotas Ordinance Ch. 23, No. 13	Allocation of Sugar quotas for local consumption and export 1st February, 1946 to 31st January, 1947
Gazette Notice No. 50 Sugar Quotas Order (No. 2 of 1946)	26/ 2/46	Sugar Quotas Ordinance Ch. 23, No. 13	Allocation of Sugar Quotas for local consumption and export 1st February, 1946 to 31st January, 1947 and cancellation of Sugar Quotas Order 1946
Production of Cane and Sugar (Amendment) Ordinance, 1946, No. 27 of 1946	26/ 4/46	Production of Cane and Sugar Ordinance, 1944	Amendment to Section 26 enabling the Governor in Council to amend Schedules
Gazette Notice No. 141	1/ 8/46	The Production of Cane and Sugar (Registration of Returns) Ordinance, 1946	
Gazette Notice No. 1933	16/10/46	Production of Cane and Sugar Ordinance, 1944	Final price of Farmers' Canes determined at $6.77 per ton
Gazette Notice No. 1758 Control of Imports and Exports	16/11/46	Control of Copra Order, 1946	Purchasers of Copra to apply to the Controller of Imports and Exports for a permit which will authorise sales by any person to the person to whom the permit to purchase is issued
Plant Protection Ordinance	13/12/46	Plant Protection (Amendment) Ordinance 1946 No. 53 of 1946, Ch. 23, No. 16	Regulations may be made under paragraph (*c*) of section 15 of the Plant Protection Ordinance by extending the provisions of the paragraph to cases of suspected harbouring of anything likely to infect a plant with any pest or disease. A slight alteration is made in the composition of the Plant Quarantine Committee and authorises the Governor in Council to vary its personnel.
Production of Cane	20/12/46	Production of Cane Ordinance No. 61 of 1946	Owing to the change of ownership of a sugar plantation it has become necessary to change the name of a manufacturer in the Second Schedule to the Principal Ordinance, consequently a general power is now being given to the Governor to amend the said Schedule without amending the Ordinance.
		VETERINARY	
Gazette Notice No. 144, Importation of Animals (Foot and Mouth Disease) Regulations, 1946	8/ 8/46	Diseases of Animals Ordinance, Ch. 25, No. 2	Under the provisions of Section 13 the landing of carcasses of animals accompanied by a certificate from a Government Veterinary Officer on a prescribed form from British Guiana, French Guiana and Dutch Guiana is allowed.